

NSF ANTARCTIC ENVIRONMENT ACT OF 1991

HEARING
BEFORE THE
SUBCOMMITTEE ON SCIENCE
OF THE
COMMITTEE ON
SCIENCE, SPACE, AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES
ONE HUNDRED SECOND CONGRESS

FIRST SESSION

MAY 14, 1991

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CONTENTS

WITNESSES

May 14, 1991:

	Page
Dr. Robert Corell, Assistant Director, Geosciences Directorate, NSF, Washington, DC; accompanied by Dr. Peter E. Wilkniss, Director, Division of Polar Programs.....	15
Evelyn M. Hurwich, Associate Director and Counsel, The Antarctica Project, Washington, DC.....	39
Bruce Manheim, Attorney and Scientist, Environmental Defense Fund, Washington, DC.....	63
Susan J. Sabella, Antarctic Legislative Coordinator, Greenpeace, Washington, DC.....	105
Dr. Robert H. Rutford, President, University of Texas at Dallas, Richardson, Texas.....	128
Robert Craig, President, The Keystone Center, Keystone, Colorado.....	141
Dr. Cornelius W. Sullivan, Director, Hancock Institute of Marine Sciences, University of Southern California, Los Angeles, California.....	143

NSF ANTARCTIC ENVIRONMENT ACT OF 1991

TUESDAY, MAY 14, 1991

U.S. HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY,
SUBCOMMITTEE ON SCIENCE,
Washington, D.C.

The subcommittee met, pursuant to notice, at 9:39 a.m. in room 2318, Rayburn House Office Building, Hon. Rick C. Boucher [chairman of the subcommittee] presiding.

Mr. BOUCHER. The subcommittee will come to order.

This morning the subcommittee will consider proposed legislation to strengthen the National Science Foundation's activities in support of environmental protection and tourism control in Antarctica.

Antarctica is a unique scientific laboratory of great value to the international community. The upper atmosphere over the pole is a screen for viewing the results of interactions of solar plasmas and the earth's magnetic field and for detecting evidence of space physics processes. The extremely stable, clean, and dry atmosphere enables astronomers to probe the universe with unprecedented precision from a ground-based site. It's an ideal biological laboratory for studying such effects as adaptation of organisms under extremes of light, temperature, and moisture, where, for example, a fish has developed natural antifreeze.

Antarctica's extreme climate, which can induce social, psychological, and physiological stresses, provides an appropriate location to study human health and performance. NASA, in fact, will be using this natural lab for human studies tied to the Manned Space Program.

Antarctica is also a major part of the global heat engine that determines world climate. The vast Antarctic ice sheet interacts with oceanic and atmospheric circulation to modulate global climate. Accordingly, the behavior of the ocean-atmosphere system in Antarctica is expected to provide an early warning of climate change. The two-mile thick ice sheet covering the pole is a repository of the past climate record of great benefit to climatologists and other scientists. Many naturally occurring global events are greatly magnified in the Antarctic environment, with the result that changes such as ozone layer depletion and climate change are first detected there.

In sum, Antarctica is one of the world's most valuable scientific research platforms, and it is this subcommittee's intention to ensure its contingent availability for a broad range of research.

The NSF has been primarily responsible for support of research in Antarctica from the beginning of the U.S. presence on that continent. Since 1971, the NSF has been responsible for budgeting and managing the entire U.S. National Antarctic Program, including logistic support. Among other responsibilities, the Foundation must ensure American compliance with the environmental protection measures contained in the Antarctic Treaty, its protocols, and other informal agreements among nations signatory to the treaty. The NSF is also responsible under the Antarctic Conservation Act to oversee the activities of U.S. citizens in Antarctica and ensure conservation, the protection of native flora and fauna, and preservation of the ecosystem.

Over the past several years, the National Science Foundation has received criticism for inadequate stewardship of the U.S. Antarctic Program as it affects the Antarctic environment. Specific actions by the NSF such as maintaining a landfill, allowing open-air burning of solid waste, and failure to remove toxic substances have received particular criticism. In addition, for over 10 years, the NSF took no action to issue regulations pursuant to the Antarctic Conservation Act to designate pollutants and to control pollutant discharge.

The value and importance of Antarctic research are well-understood. At the same time, it's recognized that the research activity itself will cause some environmental disturbance in this pristine region, where traces of human activity are preserved virtually forever. The goal, therefore, must be to weigh the environmental effects against the value of the science and develop rational ways to minimize adverse effects. Clearly, a better job must be done in the future than has been done in the past.

The purpose of the legislation which the subcommittee begins to consider today is to ensure that environmental assessment, monitoring, and control occurs for all U.S. activities in the Antarctic. The bill will require the NSF to implement a cradle-to-grave solid waste management plan for all U.S. stations, including deadlines for implementation. It requires environmental assessments of all significant activities, establishment of a long term environmental monitoring program, and a thorough environmental audit by experts from outside the NSF. The bill also calls for a review of the effects of the growing tourism industry in Antarctica and requires NSF, on the basis of that study, to issue regulations for control of tourism.

We intend, through the hearing this morning, to obtain the views of a wide range of witnesses on the overall scope and suitability of the legislation and the likely effects of its specific provisions. In addition to NSF witnesses, we're pleased to welcome Antarctic experts from environmental groups, academe, and a well-known public policy institution.

Before commenting further on the witnesses who will appear this morning, the Chair would now like to recognize the ranking Republican member of the subcommittee for his comments, the gentleman from California, Mr. Packard.

[The prepared statements of Mr. Boucher and Mr. Costello follow:]

**OPENING STATEMENT
OF THE
HONORABLE RICK BOUCHER (D-VA)
CHAIRMAN, SUBCOMMITTEE ON SCIENCE
ON
HEARING ON THE NATIONAL SCIENCE FOUNDATION
ANTARCTIC ENVIRONMENTAL PROTECTION ACT
OF 1991**

May 14, 1991

This morning the Subcommittee will consider proposed legislation to strengthen the NSF's activity in support of environmental protection and tourism control in Antarctica.

Antarctica is a unique scientific laboratory of great value to the international community:

- o The upper atmosphere over the pole is a screen for viewing the results of interactions of solar plasmas and the Earth's magnetic field, and for detecting evidence of space physics processes. The extremely stable, clean and dry atmosphere enables astronomers and astrophysicists to probe*

the universe with unprecedented precision from a ground-based site.

- o It is an ideal biological laboratory for studying such effects as adaptation of organisms under extremes of light, temperature and moisture, where, for example, a fish has developed natural antifreeze.*
- o Antarctica's extreme climate, which can induce social, psychological and physiological stresses, provides an appropriate location to study human health and performance. NASA will use this natural lab for human studies tied to the manned space program.*
- o Antarctica is also a major part of the global heat engine that determines world climate. The vast Antarctic ice sheet interacts with oceanic and atmospheric circulation to modulate global climate.*

Accordingly, the behavior of the ocean/atmosphere system in Antarctica is expected to provide an early warning of climate change.

- o The two-mile thick ice sheet covering the pole is a repository of the past climate record of great benefit to climatologists and other scientists.*
- o Many naturally occurring global events are greatly magnified in the Antarctic environment, with the result that changes such as ozone layer depletion and climate change are detected there first.*

In sum, Antarctica is one of the world's most valuable scientific research platforms, and it is this Subcommittee's intention to ensure its continued availability for a broad range of research.

The NSF has been responsible for support of research in Antarctica from the beginning of the U.S. presence on

the continent. Since 1971, NSF has been responsible for budgeting and managing the entire U.S. national Antarctic program, including logistics support. Among other responsibilities, the Foundation must ensure American compliance with the environmental protection measures contained in the Antarctic Treaty, its protocols and other informal agreements among nations signatory to the Treaty. NSF is also responsible under the Antarctic Conservation Act to oversee the activities of U.S. citizens in Antarctica and insure conservation, the protection of native flora and fauna, and preservation of the ecosystem.

Over the past several years, NSF has come under criticism for inadequate stewardship of the U.S. Antarctic Program as it affects the Antarctic environment. Specific actions by NSF, such as maintaining a landfill, allowing open air burning of solid waste, and failure to remove toxic substances, have received particular criticism. In addition, for over 10 years, NSF took no action to issue

regulations pursuant to the Antarctic Conservation Act to designate pollutants and to control pollutant disposal.

The value and importance of Antarctic research are well understood. At the same time, it is recognized that the research activity itself will cause some environmental disturbance in this pristine region, where traces of human activity are preserved virtually forever. The goal must be to weigh the environmental effects against the value of the science and develop rational ways to minimize adverse effects. Clearly, a better job must be done in the future than has been done in the past.

The purpose of the legislation is to specify actions NSF must take to ensure that environmental assessment, monitoring, and control occurs for all U.S. activities in the Antarctic. The bill will require NSF to implement a "cradle-to-grave" solid waste management plan for all U.S. stations, including deadlines for implementation. It requires environmental assessments of all significant

activities, establishment of a long-term environmental monitoring program, and a thorough environmental audit by experts from outside the NSF. Also, the bill calls for a review of the effects of the growing tourism industry in Antarctica and requires NSF, on the basis of the study, to issue regulations for control of tourism.

We intend through the hearing this morning to obtain the views of a range of witnesses on the overall scope and suitability of the legislation and the likely effectiveness of its specific provisions. In addition to NSF witnesses, we are pleased to welcome Antarctic experts from environmental groups, academe, and a well known public policy institution.

The representatives from the Antarctica Project, the Environmental Defense Fund, and Greenpeace have all been very active in focusing public attention on the need for greater efforts in the preservation of the Antarctic environment. They also are very knowledgeable about

current activities of the various nations which maintain a presence there.

We are also very pleased to have two distinguished scientists, Dr. Rutford and Dr. Sullivan, who have been involved in Antarctic research activities for most of their careers. We hope that their comments will include any concerns they may have on how the bill might adversely affect the conduct of research.

Finally, I would like to welcome Robert Craig, President of the Keystone Center, who has had considerable experience with the problems associated with human activities in hostile environments and who served on the NSF Panel on Safety in Antarctica. The Safety Panel examined all aspects of U.S. operations, and the findings of the Panel led to the major NSF Antarctic health, environment, and safety initiative which is now underway.

*We welcome all of our witnesses and look forward to
our discussions this morning.*

OPENING STATEMENT BY U.S. REP. JERRY F. COSTELLO

COMMITTEE ON SCIENCE, SPACE AND TECHNOLOGY
SUBCOMMITTEE ON SCIENCE

HEARING ON NSF ANTARCTIC ENVIRONMENTAL PROTECTION ACT

MAY 14, 1991

Mr. Chairman, I want to thank you for calling this hearing today. The documentary on Antarctica was both outstanding and informative.

The purpose of today's hearing is to obtain expert testimony on the completeness of the legislation before us. I look forward to hearing from our witnesses from NSF, the environmental groups which monitor activities in Antarctica, and representatives from the science community.

Mr. Chairman, your dedication in this area is commendable. Again, thank you for calling this hearing.

Mr. PACKARD. Thank you, Mr. Chairman, and I would like to join with you in welcoming the expert witnesses that will be testifying before us today.

I want to especially acknowledge Dr. Sullivan, the Director of the Hancock Institute of Marine Science at the University of Southern California. After receiving his Ph.D. in marine biology at the Scripps Institute of Oceanography in La Jolla, California, Dr. Sullivan has gone on to achieve great prominence in the field of microbiology and oceanography as the U.S. representative to the Scientific Committee on Antarctic Research. We certainly look forward to his testimony today.

We, of course, look forward to the testimony of all of our witnesses, and I think we have a well-balanced hearing, with the interest of the National Science Foundation, the environmental groups, and the scientific community being represented.

The Antarctic is a precious wilderness whose ecosystem should be protected. Through this hearing, we hope to form some type of consensus on how to preserve the Antarctic, while at the same time allowing, and even encouraging, scientific research to continue.

So, Mr. Chairman, I want to thank you for scheduling this important hearing and again welcome the distinguished witnesses. I'm looking forward to their testimony.

[The prepared statement of Mr. Packard follows:]

STATEMENT OF
THE HONORABLE RON PACKARD (R-CA)
SCIENCE SUBCOMMITTEE
HEARING ON THE NATIONAL SCIENCE FOUNDATION
ANTARCTIC ENVIRONMENT ACT OF 1991
2318 RHOB, 9:30 A.M.
MAY 14, 1991

THANK YOU MR. CHAIRMAN:

I WOULD LIKE TO JOIN THE CHAIRMAN IN WELCOMING THE EXPERTS WHO WILL BE TESTIFYING BEFORE US TODAY. A SPECIAL ACKNOWLEDGMENT GOES TO DR. SULLIVAN, THE DIRECTOR OF THE HANCOCK INSTITUTE OF MARINE SCIENCES AT THE UNIVERSITY OF SOUTHERN CALIFORNIA. AFTER RECEIVING HIS PH.D. IN MARINE BIOLOGY AT THE SCRIPPS INSTITUTION OF OCEANOGRAPHY IN LA JOLLA, CALIFORNIA, DR. SULLIVAN HAS GONE ON TO ACHIEVE GREAT PROMINENCE IN THE FIELDS OF MICROBIOLOGY AND OCEANOGRAPHY. AS THE U.S. REPRESENTATIVE TO THE SCIENTIFIC COMMITTEE ON ANTARCTIC RESEARCH, WE CERTAINLY LOOK FORWARD TO YOUR SPECIAL INSIGHT, DR. SULLIVAN.

WE, OF COURSE, LOOK FORWARD TO THE TESTIMONY OF ALL THE WITNESSES. I THINK WE HAVE A WELL-BALANCED HEARING WITH THE INTERESTS OF THE NATIONAL SCIENCE FOUNDATION, THE ENVIRONMENTAL GROUPS, AND THE SCIENTIFIC COMMUNITY BEING REPRESENTED. THE ANTARCTIC IS A PRECIOUS WILDERNESS WHOSE ECOSYSTEM SHOULD BE PROTECTED. THROUGH THIS HEARING WE HOPE TO FORM SOME TYPE OF CONSENSUS ON HOW TO PRESERVE THE ANTARCTIC WHILE, AT THE SAME TIME, ALLOWING SCIENTIFIC RESEARCH TO CONTINUE.

MR. CHAIRMAN, I THANK YOU FOR SCHEDULING THIS IMPORTANT HEARING AND AGAIN I WELCOME ALL THE DISTINGUISHED WITNESSES.

Mr. BOUCHER. The Chair thanks the gentleman.

Do further members of the committee seek recognition for purposes of a statement?

The gentleman from Maryland?

Mr. GILCREST. Thank you, Mr. Chairman. I would just like to make one brief comment.

We all understand the value of the Antarctic to continued understanding of life on our planet because of certain environmental studies, and I applaud the courage and the intellect of those people who are participating in those studies. And I hope as we go through the hearing this morning and we adopt regulations that we consider that there will be people studying in the Antarctic in 2090, and I hope that what we do here today will ensure that the pristine nature of that area stays intact for those people who will be doing the same thing that we're doing now. But I applaud your courage and the things you're trying to do down there, and I look forward to the testimony.

Thank you, Mr. Chairman.

Mr. BOUCHER. The Chair thanks the gentleman.

We will welcome now our first panel of witnesses, representatives of the National Science Foundation: Dr. Robert Corell, the Assistant Director of the Geosciences Directorate; accompanied by Dr. Peter Wilkniss, the Director of the Division of Polar Programs.

Without objection, your written statements will be made a part of the record, and we will be pleased to receive your oral summaries. We do have a five-minute rule with regard to oral summaries and would ask that you keep your summaries to that length so that we will have time for questions.

Dr. Corell, we'll be pleased to begin with you.

STATEMENT OF ROBERT CORELL, ASSISTANT DIRECTOR, GEOSCIENCES DIRECTORATE, NATIONAL SCIENCE FOUNDATION, WASHINGTON, D.C.; ACCOMPANIED BY: PETER E. WILKNISS, DIRECTOR, DIVISION OF POLAR PROGRAMS

Dr. CORELL. Thank you very much, Mr. Chairman and members of the committee. It is indeed a pleasure for us to appear before you today to consider the programs and operations of the U.S. Antarctic Program and, as you well mentioned, the pending legislation.

As the world becomes increasingly sensitive and aware of environmental concerns, Antarctica has assumed a greater symbolic as well as practical importance. Antarctica significantly contributes to our understanding of international ecological and environmental problems. Although it is the most remote of continents on this planet, Antarctica is the largest region of cold weather and severe operating conditions. Its influences on atmospheric and oceanic circulation have been well-documented and are crucial to our understanding of global climate and global change processes. Dramatic springtime depletions of stratospheric ozone exemplify the region as a leading indicator of man-induced environmental change on a global scale. With its ice sheet, a ledger of past global environments, Antarctica, properly interpreted, can tell us the condition of our planet in years past as well as give some understanding of its present status and future trends.

Consequently, the National Science Foundation believes firmly and strongly that there are compelling and important reasons for continued scientific research in the Antarctic and that it is crucial to our understanding of the past, the present, and the future of this planet. We also believe that such research efforts can and indeed must be done in sound, environmentally safe ways.

Antarctica is of great importance to NASA as well as the National Science Foundation and the science community with whom we work because there are compelling similarities between space and the Antarctic region. This region has been used in the past as an analog for NASA programs. Many characteristics unique to Antarctica make it appropriate for the earth analog for upcoming lunar and possibly martian outposts. Extreme remoteness, isolation, hostile environments, rugged terrains, extraordinary logistical constraints, and limited human contact make that all possible.

The National Science Foundation, in that context, manages the U.S. program in Antarctica. Scientific research is conducted through three permanent, year-round stations—one on South Pole, one at McMurdo, and one in the peninsular region at Palmer Station—as well as maintaining ship and field camps throughout the continent.

I thought I might give you just a little glimpse of the 1990-1991 austral season, some of the things that have been foremost on our scientific agenda. Biological studies, amongst many others, have focused on efforts to understand enhanced levels of UVB—ultraviolet radiation—reaching the Antarctic continent due to the ozone hole. Results show that some phytoplankton species contain UVB-blocking mechanisms, which may play a role in mediating some of the more harmful effects of ultraviolet radiation.

At the South Pole, cosmologists have made some of the most sensitive ground-based measurements ever made of the variation in the brightness in cosmic microwave background radiation, and balloon experiments have investigated gamma ray emissions from the sun, cosmic ray composition, and auroral x-ray emissions. Oceanographers have completed the first phase in a long term ongoing study of biogeochemical cycling not only of silica, but of carbon in the Antarctic Seas. Results will be applied to our understanding of global nutrients important to the fisheries community, global productivity, as well as closing the carbon budget, so important to the community concerned with global change.

Geophysicists and glaciologists took a major step in cooperative research with successful deployment of combined remote sensing instrumentation for geomagnetics, gravity, and ice radar from small aircraft. Geological work, as some of you may have noted, has led to the development of new theories about early Paleozoic reconstruction of the world's continents.

In upcoming seasons, we're about to establish the Center for Astrophysical Research in Antarctica. It will be at South Pole Station, and it will turn South Pole Station into a permanent, year-round observatory for infrared and radiowave astronomy, a major development for the astronomical and geophysical community, and we are delighted with its prospect. We've also recently established long term ecological research sites in the vicinity and around Palmer Station that will focus on effects of interannual variability

of sea ice and its effect on marine phytoplankton, krill, krill-feeding fish and birds, and, of course, mammals.

Oceanography studies in upcoming years will be done jointly with the USSR at a new floating ice camp in the western Weddell Sea. The U.S. group will study the formation and dispersal of Antarctic bottom water, ocean-atmospheric energy exchange, and its modulation of sea ice cover. Increased use of modern geophysical equipment in Antarctica will allow geologists and glaciologists to address the evolution of Antarctic ice sheets, their stability, dynamics and relationship to climate, volcanism and neotectonic events. Seismic field studies will address the structure, tectonics, and paleoenvironmental history of the Antarctic continental crust and associated sedimentary basins.

While pursuing scientific research in the Antarctic, the NSF simultaneously has been strengthening its environmental stewardship, a responsibility which we take extremely seriously. Several years ago, the NSF began a series of steps designed to enhance environmental practices in Antarctica. The NSF issued an environmental protection agenda and began implementing measures to safeguard the Antarctic environment. Reviewing NSF compliance with environmental standards in Antarctica, we've made extensive recommendations to improve existing practices and, through a new initiative, are now implementing and have issued comprehensive strategy and implementation plans to remedy past mistakes—well-identified in your opening remarks, Mr. Chairman—and to prevent future environmental harm.

These actions, with the full support of the Congress, the President, through a proposed \$180 million, five-year safety, environment and health initiative are designed to improve these operations. Approximately \$30 million will be spent over a five-year period to incorporate sound environmental practices into the United States Antarctic Program. The major focus of the environmental portion of this initiative will be the creation of cradle-to-grave waste management systems for the United States Antarctic Program. The initiative will address solid and hazardous waste handling, wastewater treatment, control of air emissions, oil spill prevention, cleanup of current and abandoned sites, pollution control permitting, environmental assessments, and monitoring and reporting. We believe this to be a comprehensive approach to a matter that well deserves attention.

For example, the NSF recently decided to suspend landfill operations at McMurdo Station and to cease open burning. As a result of this decision, we will be retrograding virtually all solid and hazardous waste. Food waste, food-contaminated waste, and selected domestic waste will be disposed through incineration, a small portion of the total problem.

The NSF assessed, pursuant to Executive Order 12114, the environmental impact of incinerator installations and will continue to assess the impact of incineration at McMurdo Station. Open burning and alternatives of retrograding of materials and incineration were fully discussed in a draft supplemental environmental impact statement for the U.S. Antarctic Program, which was released for public comment in early January of this year. Many insightful comments have been received from the public and are now being

considered for incorporation in the final programmatic environmental impact statement.

NSF is committed to applying in Antarctica no less stringent protection than afforded by U.S. domestic environmental statutes. In conjunction with the objectives obtained in the safety, environmental and health initiative, we must review the support of infrastructure to develop the most efficient management and methods to conduct operations and logistics.

I thought, with your permission, Mr. Chairman, I might ask Dr. Wilkniss to address a couple of items: one, some of the accomplishments already realized from this initiative in the environment in Antarctica; and to say a few words about the bill you mentioned in your opening remarks.

[The prepared statement of Dr. Corell follows:]

NATIONAL SCIENCE FOUNDATION
STATEMENT OF
DR. ROBERT CORELL
ASSISTANT DIRECTOR, GEOSCIENCES DIRECTORATE
BEFORE THE
COMMITTEE ON SCIENCE, SPACE AND TECHNOLOGY
SUBCOMMITTEE ON SCIENCE
U.S. HOUSE OF REPRESENTATIVES
MAY 14, 1991

Mr. Chairman, members of the Subcommittee, it is a pleasure to appear before you today as you consider the operations of the United States Antarctic Program (USAP) and pending legislation. I am Dr. Robert Corell, Assistant Director for Geosciences at the National Science Foundation. I am joined by Dr. Peter Wilkiss, Director, Division of Polar Programs.

As the world becomes increasingly sensitive to environmental concerns, Antarctica has assumed greater symbolic and practical importance. Antarctica significantly contributes to our understanding of international ecological and environmental problems, such as global climate change and ozone depletion. The National Science Foundation firmly believes that continued scientific research in Antarctica is crucial to this understanding of the world. We also believe, that such U.S. research efforts can, and indeed must, coexist effectively with sound environmental practices in Antarctica.

The National Science Foundation (NSF) manages the United States national program in Antarctica. Scientific research is conducted from three permanent, year-round stations in Antarctica, Amundsen-Scott South Pole Station, McMurdo Station, and Palmer Station, as well as from ships and field camps.

During the 1990-91 austral season, for example, scientists from a variety of disciplines conducted research in Antarctica. Biologic studies have focused on the effects of enhanced levels of ultraviolet (UV-B) radiation reaching Antarctica due to the ozone hole; results have shown that some phytoplankton species contain UV-B blocking compounds which may play a role in mediating the harmful effects of UV radiation. At the South Pole, cosmologists made the most sensitive ground-based measurements to date of the variations in brightness in cosmic microwave background radiation and balloon-borne experiments investigated gamma

ray emissions from the sun, cosmic ray composition and auroral x-ray emissions.

Oceanographers have completed the first phase of an ongoing study of biogeochemical cycling of silica and carbon in the Antarctic Seas; results will be applied to an understanding of global nutrient levels and oceanic productivity and will provide information on closure of the organic carbon budget. Geophysicists and glaciologists took a major step in cooperative research with the successful deployment of combined remote sensing instrumentation for geomagnetics, gravity, and ice radar from a single small aircraft. Geologic work led to the development of a new early Paleozoic reconstruction for the world's continents. This new tectonic model will help to explain the origin of the Pacific Ocean and the biogeographical dispersion of early land-dwelling fauna.

In upcoming seasons, the recently established Center for Astrophysical Research in Antarctica (CARA) will turn South Pole Station into a permanent, year-round observatory for infrared and radio wave astronomy. A Long-Term Ecological Research (LTER) project has been established in the vicinity of Palmer Station, and will focus on the effects of interannual variation of sea ice on marine phytoplankton, krill and krill-feeding fish and birds and mammals. In oceanographic studies, USAP will support a joint US/USSR floating ice camp in the western Weddell Sea. The U.S. group will study the formation and dispersal of Antarctic Bottom Water and ocean-atmosphere energy exchange and its modulation by the sea ice cover. Increased use of modern geophysical equipment in Antarctica will allow geologists and glaciologists to address the evolution of the Antarctic ice sheets and their stability, dynamics and relationship to climate, volcanism and neotectonic events. Seismic field studies will address the structure, tectonics and paleoenvironmental history of the Antarctic continental crust and associated sedimentary basins.

While pursuing scientific research in Antarctica, NSF simultaneously has been strengthening its environmental stewardship in Antarctica. Several years ago, the National Science Foundation began a series of steps designed to enhance U.S. environmental practices in Antarctica. The Foundation issued an Environmental Protection Agenda, began implementing measures to safeguard the Antarctic environment, reviewed NSF compliance with environmental standards in Antarctica, made extensive recommendations to improve existing practices, and issued a comprehensive strategy and implementation plan to remedy past mistakes and prevent future environmental harm.

As a result of these actions, NSF, with the support of the President and Congress, proposed a \$180 million five-year Safety, Environment, and Health Initiative to improve safety, health, and environmental conditions of U.S. operations in the Antarctic. Approximately \$30 million will be spent over a five-year period to incorporate sound environmental practices into the United States Antarctic Program. The major focus of the environmental portion of this initiative will be the creation of a cradle-to-grave waste management system for the United States Antarctic Program. The initiative will address solid and hazardous waste handling, wastewater treatment, control of air emissions, oil spill prevention, cleanup of current and abandoned sites, pollution control permitting, environmental assessments, and monitoring and reporting. NSF is committed to applying in Antarctica no less stringent protection than that afforded by U.S. domestic environmental statutes.

Now in our second year of this five-year initiative, we wish to share with you today some of our accomplishments. NSF, working with the Department of Energy's Argonne National Laboratory, Idaho National Engineering Laboratory, and Oak Ridge National Laboratory, is implementing a comprehensive waste management plan, including waste minimization,

handling and disposal at McMurdo Station. NSF has suspended the practice of open pit burning at McMurdo Station and has ceased landfilling operations at the Fortress Rocks site. Because U.S. Department of Agriculture regulations prevent food waste and other food-contaminated wastes from entering the U.S., NSF has built a temporary incinerator on site to burn this waste for the remainder of the present winter season. A more permanent commercial incinerator will be installed during the 1991-92 season. The incinerator ash will be removed from the continent.

Our goal is to retrograde from Antarctica virtually all other solid waste. In fact, by mid-December, 1990, at least fifteen cargo containers were full of waste metal waiting to be removed from Antarctica. As in the past, all hazardous waste will continue to be returned to the United States for proper disposal. An interim hazardous waste storage yard has been completed, and a permanent facility is in the design stage.

Commencing this past season, sewage at all coastal stations is being treated with maceration and dilution, as recommended by the Scientific Committee on Antarctic Research and adopted by the Treaty parties. All wastes from the Dry Valley research camps are returned to McMurdo for disposal.

In the area of fuel spills, management efforts continued on several fronts. During December, 1990, NSF replaced the flexible hose for the fuel transport line between McMurdo and Williams Field with a new "dry break" fuel hose. The new "dry break" fuel hose will have only 13 fittings, compared to over 700 in the old fuel transport line. This will diminish greatly the chances of oil leakage. We are also upgrading fuel storage facilities at South Pole, Williams Field and Marble Point. In addition, spill response contingency plans are being formulated.

NSF also chairs the Antarctica Pollution Control Task Force, consisting of inter-agency members from EPA, NOAA, Navy Interior, and the State Department, and other non-governmental members representing organizations such as the Environmental Defense Fund and World Resources Institute. This advisory committee is assisting NSF in designating pollutants and creating a permit program controlling the discharge of pollutants by United States citizens in Antarctica. NSF expects to issue draft regulations by the end of this year.

NSF is also supplementing its USAP programmatic Environmental Impact Statement. A draft was released for public comment in January, 1991. We are currently evaluating the many insightful comments which we received and shall incorporate pertinent recommendations in the final version which will be available around August 30, 1991.

NSF has hosted four briefings over the past three years to inform environmental groups, Federal agencies, and other interested parties about our environmental actions and progress.

Increased tourism to Antarctica and its resulting impact on the Antarctic environment remains a concern for NSF. We have already promulgated regulations under the Antarctic Conservation Act which govern the activities of U.S. citizens, including tourists, affecting native species of Antarctica and its environment. These regulations also control access to "specially protected areas" and "sites of special scientific interest" (45 C.F.R. Part 670). NSF recently promulgated enforcement procedures and tourism guidelines which provide for administrative enforcement of the ACA and NSF's conservation regulations and require U.S. tour operators to distribute NSF literature to Antarctic tourists designed to heighten their environmental awareness (45 C.F.R. 670 Subpart K). U.S. tour operators recently adopted

guidelines to minimize the impact of their visits on the environment. NSF, for the first time, placed representatives this past season on several tour ships to monitor the activities of tour operators and tourists while visiting Antarctica.

In the area of Treaty developments, the Antarctic Treaty parties met in Madrid, Spain on April 22-30 to continue negotiation of a protocol and associated annexes for the protection of the Antarctic environment. The draft Protocol succeeds in formalizing environmental protection procedures while ensuring that science in Antarctica can continue to flourish. The NSF environmental initiative is consistent with the proposed protocol.

One of the issues raised at the meeting involves the formation of a committee with the authority to evaluate the environmental impact of activities proposed to be undertaken by Treaty Parties and report its findings to the regular Antarctic Treaty Consultative Meetings. The committee's authority will be limited to an advisory function, a position consistent with that of the National Science Board and the Administration. NSF believes that expansion of the committee's role beyond an advisory one would compromise U.S. scientific research in Antarctica.

Finally, we are grateful for the opportunity to comment on the bill which you, Mr. Chairman, recently drafted entitled the "National Science Foundation Antarctic Environmental Protection Act of 1991." We appreciate your recognition of NSF's leadership role in the Antarctic. The Presidential Memorandum 6646, dated February 5, 1982, directs the National Science Foundation to "budget for and manage the entire United States national program in Antarctica, including logistic support activities so that the program may be managed as a single package." The National Science Foundation Act of 1950, as amended, also directs the

vesting in NSF the authority to make contracts or other arrangements to support such activities. NSF has performed its lead agency role in providing scientific and environmental leadership for the Antarctic program under the Presidential Directive, and the National Science Foundation Act. Your bill reaffirms the role of NSF as the Federal agency responsible for administering U.S. operations in Antarctica and their environmental aspects in a coordinated fashion.

The bill also acknowledges the need for Antarctic pollution control measures by requiring the issuance of pollution control regulations and permits. It prohibits, unless authorized by permit or regulation, the discharge of hazardous and toxic pollutants, ice staging, ocean dumping, transport of hazardous and toxic pollutants to Antarctica for disposal, and discharge of sewage and wastewater. It also phases out open burning. In addition, the bill requires the Director of NSF to develop a complete solid and hazardous waste management plan and issue regulations providing for the environmental assessment of major Federal actions which significantly impact on the Antarctic environment; it provides for an environmental audit of U.S. operations in Antarctica by a panel of experts; and requires submission of a report to Congress on the impact of tourism on the Antarctic environment and the adequacy of current environmental protection measures for tourists.

We agree with the objectives of the bill, and the need to strengthen Antarctic environmental management and pollution control measures. The legislation affirms the USAP's commitment to sound environmental practices in Antarctica. The bill's provisions parallel USAP's current environmental goals and actions and the requirements set forth in the Treaty and adopted recommendations. The bill's prescribed timetables are consistent with the implementation of NSF's strategy for compliance with environmental law in Antarctica. Enactment of this bill

would signal U.S. leadership in the global effort to protect the Antarctic environment.

NSF believes this proposed legislation avoids several major flaws which were present in Antarctic bills introduced last session, and remain present in Antarctic bills introduced in the current Congress. For example, other bills seek to make the National Environmental Protection Act (NEPA) directly applicable to Federal activities in Antarctica. NSF opposes this because similar requirements exist under Executive Order 12114 and treaty recommendations. In addition, lawsuits brought under NEPA could inhibit international cooperation in Antarctic scientific research. Citizen suits were also present in proposed legislation last session. Such provisions could allow private litigants to file lawsuits seeking injunctions, regardless of the merits of their claims. Your bill offers a much more constructive and positive alternative by providing for an independent audit of U.S. Antarctic stations by a panel of experts. Both NEPA and citizen suit provisions could severely impede U.S. operations and scientific research in Antarctica. Finally, other Antarctic bills created duplicative programs and dispersed authority for environmental programs in Antarctica. Your bill, Mr. Chairman, does not contain any of these objectionable provisions. The Administration is willing to work with you to resolve several drafting concerns that have been drawn to our attention by various agencies.

NSF is setting an example for responsible environmental practices in Antarctica. With continued Congressional support, we will maintain a strong scientific presence in Antarctica and help set an international example for environmentally sound practices. Mr. Chairman, this concludes my prepared remarks. I will be happy to answer any questions.

Mr. BOUCHER. Thank you, Dr. Corell.

Dr. Wilkniiss, we will be pleased to hear from you.

Dr. WILKNISS. Thank you, Mr. Chairman.

I would like to begin with telling you that we're grateful for the opportunity to comment on the bill which you, Mr. Chairman, recently drafted entitled "The National Science Foundation Antarctic Environmental Protection Act of 1991." We appreciate your recognition of the Foundation's leadership role in the Antarctic.

The President issued Memorandum 6646 February 5, 1982, that directs the Foundation to budget for and manage the entire United States National Program in Antarctica, including logistic support activities, so that the program may be managed as a single package. The National Science Foundation Act of 1950, as amended, also directs vesting in NSF the authority to make contracts or other arrangements to support these activities. NSF has performed its lead agency role in providing scientific and environmental leadership for the Antarctic Program under the Presidential directive and the National Science Foundation Act.

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Finally, other Antarctic bills created duplicative programs and dispersed authority for environmental programs in Antarctica. Your bill, Mr. Chairman, does not contain any of these objectionable provisions.

The Administration is willing to work with you to resolve several drafting concerns that have been drawn to our attention. Thank you very much.

Now, with your permission, and if there is still time, I would like to turn to the accomplishments under the environmental initiative.

Mr. BOUCHER. Dr. Wilkniss, I would appreciate that, and if you could be relatively brief in that summary, that would be very helpful.

Dr. WILKNISS. Maybe, then, better I respond to your questions on that so I don't take up any more of the committee's time.

Mr. BOUCHER. Well, thank you very much.

I would like to extend the committee's thanks to both witnesses for their presentation this morning and particularly for statements of support for the draft legislation.

Well, Dr. Wilkniss, let's begin with where you left off. Talk a little bit, if you would, about your current environmental initiative and compare that initiative to the four annexes which the negotiators for the International Treaty have now taken back to their host governments for consideration and also, if you would, to the provisions of this bill. Give us a general overview of those three subjects and how they interrelate, if you would.

Dr. WILKNISS. I will try to do that, Mr. Chairman. That's a pretty tall order.

We are guided by the Executive Order and, therefore, implicit by all the understandings, perceptions, regulations, and laws that this country would like to see done within its own borders, so we have crafted our environmental initiative accordingly.

As far as the treaty is concerned, the United States delegation and, in particular, our specialists, scientists, and environmental experts that we have, have had a great influence and have helped to craft and make this new treaty protocol and the annexes very much a thorough and understanding annex, because you will find that in the world the U.S. is most advanced, I think, in environmental legislation and in our implementation in the expertise we have. So we have had a great influence—the U.S., I should say—on what the treaty has been doing in this area, and, therefore, I think, not only are we consistent with what the treaty is recommending, we're still a little bit out in front of it.

I think in your bill it reflects in a very realistic sense, one, what our obligations are under our own national perceptions, views, laws, and regulations, but also it sets forth in very practical and rational and reasonable, achievable terms what we can do in the amount of time that we have and with the funding that the President has requested and the Congress has made available.

Mr. BOUCHER. If I understand your answer, you're suggesting that the current practice at the NSF is at least as stringent with respect to environmental protection as would be the practices under the new annexes which are presently in the process of negotiation. Is that correct?

Dr. WILKNISS. Yes, Mr. Chairman, and I think we will achieve it earlier than is set forth under the annexes in the treaty protocol.

Mr. BOUCHER. Have you participated in the negotiations that are bringing about these annexes?

Dr. WILKNISS. I have not done so personally, Mr. Chairman, but the National Science Foundation, in the Division of Polar Programs, Mr. Talmadge has been a member of the delegation led by Secretary Bohlen from the State Department.

Mr. BOUCHER. And is it reasonable, then, to assume that the National Science Foundation is comfortable with the provisions of these annexes as they are being taken back now to the host countries?

Dr. WILKNISS. Yes, sir. I should say from an environmental point of view speaking, we are comfortable with what is suggested.

Mr. BOUCHER. I think we probably will hear testimony later—I don't want to prejudge that, but my assumption is that we're going to hear testimony later, perhaps from one or more of the environmental groups, that the best course of action for this subcommittee to take at this time is not to go forward with legislation that will specifically direct the NSF and its environmental protection activities in the Antarctic, but instead to wait until the annexes have gone through the process of formal ratification and have become protocols to the treaty. What is your response to that recommendation? Should we wait, or should we go forward at this time?

Dr. WILKNISS. This is a very interesting question, and I can see the point of view that implementing legislation and following a treaty protocol and annexes, once they're set in place, is a desired way to go. At the same time, the Antarctic doesn't stand still, Mr. Chairman, and a number of other bills have been introduced, and if yours would be the only legislation waiting while the other bills go forward which come from different perspectives and do not recognize the centrality of the research and its benefits in the Antarctic, that might not be a good way to go.

Mr. BOUCHER. So your recommendation is to go forward, and we'll probably not have the process completed by the time the protocols are formally ratified in any event.

Dr. Corell, do you wish to comment?

Dr. CORELL. Yes. I just might add yesterday we had the opportunity to examine some of these matters before Senator Gore in a hearing on this and related matters, and Assistant Secretary Bohlen indicated at that time that the draft is out for thorough review and that they expect the U.S. position and other nations' positions on that meeting in Madrid to come forth in the next sev-

eral weeks. And there's hope that at the next meeting in June there will be adequate agreement to move ahead and sign that.

Mr. BOUCHER. Educate me, if you will, about the required procedure for formalization of these annexes. Are these amendments to the treaty of the magnitude that would require Senate confirmation and Senate approval in order to become effective?

Dr. Wilkniiss?

Dr. WILKNISS. I think the annexes themselves become part of the protocol, and the protocol will need the consent of the Senate.

Mr. BOUCHER. All right. Now, that is a process that might take some considerable length of time. Do you have any prediction for the time frame within which these annexes might become protocols and the protocols might in turn be ratified?

Dr. WILKNISS. I think it will be driven by the time it takes to get all the countries that are involved, some 39, to agree to this protocol. That may be the defining factor before the documents are deposited with the depository government, and then it will be submitted.

Mr. BOUCHER. Is there any expectation that that process will be completed, including ratification of these protocols by some 39 separate nations, by the end of this year or even by the end of next year, Dr. Corell?

Dr. WILKNISS. Mr. Chairman, we were just given an estimate of two to four years.

Mr. BOUCHER. Three to four years?

Dr. CORELL. Two to four years.

Mr. BOUCHER. Two to four years.

Dr. CORELL. I've just asked Jack Talmadge, who has been a member of that delegation and has been at all the appropriate meetings with Secretary Bohlen, and to have all countries go through their due deliberate review of these and sign on is something like two years and max four, we think.

Mr. BOUCHER. So we are several years away, at a minimum, from having those provisions become fully effective with regard to activities within the Antarctic. It would seem to me that that makes a stronger case still for going forward with the legislation that we are considering here this morning. Would you agree?

Dr. WILKNISS. Yes, Mr. Chairman.

Mr. BOUCHER. Let me ask you about several specific activities that the NSF has under way in the Antarctic. Has the open burning been stopped at McMurdo Base? That's been one of the greatest criticisms I've heard of NSF's practices in the Antarctic. Where do you stand with that?

Dr. WILKNISS. We suspended open burning at the end of the last season. I issued a memorandum to that effect in the Antarctic in February, and I think the last burn occurred in the first week of March to get rid of the accumulated material, and, since, we have held the burnable waste in storage, and we are in the process of completing our first interim incinerator to burn it under controlled conditions.

Mr. BOUCHER. So you have stopped the open burning for now?

Dr. WILKNISS. Yes.

Mr. BOUCHER. And open burning does not occur anywhere else in the Antarctic under U.S. supervision, does it?

Dr. WILKNISS. Not at this time.

Mr. BOUCHER. All right. And it's not your intention to allow that in the future. Is that correct?

Dr. WILKNISS. That is correct, Mr. Chairman.

Mr. BOUCHER. Good. You have waited some 13 years before issuing regulations under the Antarctic Conservation Act to, first of all, designate categories of pollutants, and then secondly, provide for a permitting system for the discharge of those pollutants. Now, why did you wait for so long, as a first question, and secondly, what is the status of your current effort to issue regulations under that act?

Dr. WILKNISS. First, Mr. Chairman, that's clearly a shortcoming of the NSF. The first review done by the agency after the issuance of the act in 1978 concluded that no further regulations were needed. In the middle of the 1980s, then-Director Bloch started a major review of all of our activities in the Antarctic, which included a complete legal review by experts who had dealt with environmental matters, and they identified these shortcomings. So we proceeded then to get on and remedy our shortcomings in issuing regulations.

Right now, we have an interagency panel, including the EPA, NOAA, many other agencies, and also the Environmental Defense Fund and the World Resources Institute, to craft these pollutant regulations and permitting process, and we expect to have them out by the end of this year for comment.

Mr. BOUCHER. Well, I guess I would just make the comment that the Antarctic Conservation Act some 13 years ago did direct you to issue regulations for this purpose. There has been a very lengthy delay. It has led people in some quarters to question the degree of seriousness with which the NSF has undertaken its environmental control responsibilities in the Antarctic. So I would encourage you to proceed with all due diligence to get that process completed.

Dr. WILKNISS. Mr. Chairman, we stand corrected, and the agency at the highest level, the National Science Board, and the Director has turned their attention to it and is keeping their attention on these matters.

Mr. BOUCHER. Let me ask you about the control of tourism in the Antarctic, which is the other provision covered in the legislation under consideration today. As a first matter, have you undertaken any general assessment of the effects of tourism in the Antarctic, and can you give us just a brief summary of what those effects are?

Dr. WILKNISS. We have not undertaken a formal general assessment, but we know from our experience what the impact of tourism is. I think the tourism up to this point has been growing. It may have stabilized now. We don't see any skyrocketing of the tourism. The impact is several-fold. One, tourists not only like to see the environment, but how people work and live in the Antarctic, so they come to our bases. So they impact our station operations and especially the conduct of scientific research. We've come to excellent voluntary agreements with companies working from the United States, and we have, I think, mitigated that impact.

The second impact, and that's much harder to control—I would like to say that the Antarctic coastline is 20,000 miles, almost twice that of the United States—is the desire to visit pristine areas, pen-

guin colonies, and so forth and so on. We have no prescription at this time how you could police, so to speak, a coastline of 20,000 miles. We have very interesting proposals to understand this. Two companies are willing to set up an experiment where similar, say, penguin colonies that are pristine and where tourists have access be studied to see what this kind of impact is. But the fact remains that in this huge continent there will still be areas that we think are pristine set aside for science that may be seeing tourists.

Mr. BOUCHER. In your opinion, is the greatest impact of tourism in the Antarctic on the environment itself, or is it on the research activities that interface with tourism?

Dr. WILKNISS. It is both, Mr. Chairman, and I think the tourism companies have been extremely responsible, maybe more so than government operators, in keeping their vessels in excellent shape and educating the tourists and the crews in what to do and what not to do, but the fact remains in areas that were pristine and not visited are being visited by several hundred, several thousand tourists.

Mr. BOUCHER. What is the raw number of tourists that visit the Antarctic every year?

Dr. WILKNISS. I should say it's on the order of several thousand. Maybe this year 3,000 to 4,000. And most of them go there by ship and visit the coastal areas, and, of course, that is the most wonderful things to see, the animals, and I think that's where the impact is.

Mr. BOUCHER. How many of those are Americans?

Dr. WILKNISS. I should say most of them. Eighty percent or more are Americans.

Mr. BOUCHER. And they come on American flag carriers?

Dr. WILKNISS. No, sir. You cannot get with an American flag carrier close to the Antarctic. They come through South America on South American carriers. They come to New Zealand or Australia on the respective national airlines.

Mr. BOUCHER. And since they are coming mostly on foreign flag ships, if I hear your statement correctly, you have a good cooperative relationship with the owners of those vessels, and the fact that they're foreign flag carriers doesn't hamper your ability to enter into those relationships. Is that an accurate summary?

Dr. WILKNISS. I should say it's been all voluntary, and they have seen that to work within our regulations in the Antarctic Conservation Act and the tourism regulations and enforcement and guidelines that we have promoted that it is in their own best interest, especially as the clientele is mostly U.S. citizens, to voluntarily comply and work with us.

Mr. BOUCHER. You are probably aware of the fact that another committee in the House has begun examining the question of the regulation of tourism in Antarctica. The Energy and Commerce Committee, in fact, is considering legislation that would confer most of that authority on the U.S. Department of Commerce. I would welcome your statements with respect to that proposal and your answer to the question as to whether the NSF, essentially being an agency that funds science research, is the proper agency to engage in a regulatory program with respect to what is now a

growing industry in Antarctica. Are you better situated to regulate tourism, or is the Department of Commerce?

Dr. CORELL. First of all, Mr. Chairman, we'd be pleased to make comments, and if we may do that to the record so that we have a chance to look at the actual text—

Mr. BOUCHER. That's fine.

Dr. CORELL. I would like to just back up a bit. One of the things that happened in the early 1970s was to integrate the national Federal Government's responsibilities with respect to Antarctica to one agency. As a relatively recent-comer to NSF, only three and a half years ago, and having watched the Antarctic Program over years, that, in my mind, is a landmark decision because it holds one agency totally responsible for the operations and management of the program. We take that extraordinarily seriously. The National Science Board and the Director take that extraordinarily seriously. So in that context, we would answer that we believe that that integration should remain and, in a sense, hold us to the fire on it, which we believe is appropriate.

Prior to that, there were distributed responsibilities and then extraordinarily difficult to manage something that distant, that complex, through a variety of such mechanisms. It's one of the reasons you hear us speaking comprehensively about that responsibility and being certain that we're consistent to every possible interpretation of the law that applies, and we would continue to do so. But we reserve, you know, final judgment on that matter to having a more thorough review of the proposal, but that's our initial reaction.

Mr. BOUCHER. Well, I thank you for that response. The record of this hearing will remain open for your supplemental answer, if you care to submit that in writing. I noted the suggestion that there might be some recommendations from the NSF with regard to fine-tuning various provisions of the bill which we're considering today, and we would welcome those suggestions in writing as well.

That concludes the Chair's questions, and the Chair now recognizes the gentleman from California.

Mr. PACKARD. Thank you, Mr. Chairman.

What are your views on applying U.S. environmental standards to the Antarctic as the procedure to protect the Antarctic? Maybe I can precede that question with how much research is being done by U.S.-directed firms and organizations, and how much is being done by other signatories to the treaty and other foreign countries?

Dr. WILKNISS. That is a very good question, and I believe that, especially in recent years, the conduct of research has come more to the fore in the Antarctic because of the recognition what an essential, indisposable component of our global system it is. All the countries do not have the same amount of research in their bases going on. We certainly are the leader in this research from the ozone hole to understanding the whole ice sheet to the impact to looking out in the universe and to studying the deep water formation in the Antarctic. So I should say that next to us, nations like the United Kingdom, France, Soviet Union are a second tier of countries that invest in research. Not quite as in the leadership role that we do have.

Mr. PACKARD. You mentioned that the U.S. probably has 80 percent or more of the tourists that go to the Antarctic. Would you suggest that 50 percent or more of the research being done in the Antarctic is American-directed research?

Dr. WILKNISS. Yes, sir, that is correct. Fifty percent or more. I don't want to put an upper limit on it, but I might go as far as saying 75 percent.

Mr. PACKARD. So U.S. policy in terms of environmental protection could very well drive the total global policy for the Antarctic. Is that true?

Dr. WILKNISS. Yes, sir, I agree with you, and the example is the ozone hole, where the national effort that has been exerted in the Antarctic to understand this phenomenon caused by man-made activities has affected international treaties that affect economic issues and international politics.

Mr. PACKARD. If we followed the protocol process, which is dealing with the international community in the Antarctic, versus the legislative strategy that deals primarily with the U.S. view or approach to environmental protection in the Antarctic, which would be—what is your response to those tracks that we are now following?

Dr. CORELL. I think they are consistent one with the other. One might look at it this way: that our support, as indicated by Peter [Wilkniss], to this bill is a part of a larger effort by the NSF to, if you will, exert leadership internationally. Several years ago, Peter and the NSF were instrumental in establishing a group among the operators of Antarctic programs around the world. They now meet frequently. They share common problems, and they have addressed these kinds of issues aggressively—the environmental issue and the tourism issue.

It provides us a venue through which we can provide U.S. leadership and work with other nations to be certain that what we are doing in trying to move forward on these issues is something that is shared. I think it's an excellent backdrop to the more formal arrangements that were dealt with in Vina del Mar and in Madrid. So you might see it as a multi-element package to get at the issue. We fully support both of them, and we see them both consistent one with another.

Mr. PACKARD. So you see the legislative strategy as an adjunct and perhaps an assist to the protocol strategy rather than an impediment?

Dr. CORELL. That's correct, sir.

Mr. PACKARD. What do you see as the primary stumbling blocks to a consensus? What are the issues that will divide the nations?

Dr. WILKNISS. There is a saying in the United States to have a level playing field, and if we're talking about our national situation, we're devoting a lot of attention and resources to be environmentally responsive. For some of the other countries, it is very difficult to do the same, and when you talk about the implementation to cleaning up a base, to introducing new technology, it will be very difficult for them to make the resources available to fully comply with the treaty recommendations in a reasonable amount of time. I think that will be one of the major issues. The perception

is there. They're wanting to do it, but the national capabilities in resources are not there.

Mr. PACKARD. So you see that it may be some time before there could develop a consensus on a protocol?

Dr. WILKNISS. I don't think so, Mr. Packard. I think the consensus will be there, but the implementation—like we said, the two to four years—I think that will be one of the stumbling blocks. But there is light at the end of the tunnel and one very interesting development—almost like with the space stations—there is now a strong current among the Antarctic Treaty nations to have truly joint international stations so that everybody doesn't have to go around and make their own investment; that we, one, avoid duplication of effort—there are very few trained scientists in the Antarctic, their research is very expensive—and two, it will mitigate the environmental impact, and there's a strong desire to go to truly international stations. I think that will help, also.

Mr. PACKARD. During that lengthy period of time, has NSF done—do you feel comfortable with your policies as they're now being implemented that will go as far as you feel we can or ought to go in terms of protecting the environment there now, in terms of your ban on open burning, your dumping into the ocean raw sewage, et cetera, et cetera? Are you taking the necessary precautions, in your judgment, that will protect during that interim implementation period?

Dr. WILKNISS. Mr. Packard, the agency is totally committed from the National Science Board and the Director on down. Fortunately, through the appropriations, resources have been made available to us to do these things, and while we're not there—it's not easy to accomplish these things in the Antarctic—I'm confident that our commitment in the process and the people and the management we have in place will achieve it by the middle of this decade.

Mr. PACKARD. Even by voluntary mechanisms, as you mentioned, you feel comfortable that that will be adequate?

Dr. WILKNISS. Yes, sir, I do.

Mr. PACKARD. Thank you, Mr. Chairman.

Mr. BOUCHER. The Chair thanks the gentleman and recognizes the gentleman from Maryland, Mr. Gilchrest.

Mr. GILCHREST. Thank you, Mr. Chairman.

So in other words, NSF, being responsible for enforcing the environmental regulations, feels that it has adequate resources so that those regulations are complied with, whether voluntary or through existing regulations?

Dr. CORELL. Absolutely, yes. I want to back up a bit. When our Environmental Program was drafted in the mid-1980s and then proposed as a major initiative to do this operation in the Antarctic over a five-year period, the Administration, both the previous one and the current one, were fully in compliance and recommended the full level of funding that we sought—\$180 million—and that has sustained itself through all of the recent years. In fact, there have been no changes. We believe we're on track with the original plan, and, further, the Congress has been supportive of this initiative. In my judgment, that's unique to have all those parties on board to help us get on with the job. We have similarly put into

place within the Foundation an office and the appropriate manpower to do the job. We've been supported in so doing.

So I think in this particular case we've had full support on all fronts to move forward on this initiative, and we are determined that it will stay on track, and we have the internal management machinery to assure ourselves that we meet the five-year targets that we set for ourselves and that we have shared both with the Congress and with the public.

Mr. GILCHREST. Thank you. The new type of—I suppose there is still incineration going on there, but could you explain what type of incinerator you have; what, if anything, comes out of that type of smokestack; and what do you do with the ash from the things that are incinerated?

Dr. WILKNISS. Our biggest problem is waste management. Many things we can retrograde, but there are two types of waste—domestic waste and food waste—which we cannot retrograde to the United States because of the regulations of the Department of Agriculture. So we have no alternative but to burn food waste and domestic waste in the Antarctic. The incinerator that we hope will come into operation next week is designed by our program. It's a two-chamber interim incinerator, and we will replace it later on this season, when the summer returns to Antarctica in October, with a commercial type.

The effluents—the emissions that we have in our interim incinerator will not be completely up to the standards that we would like to see in the commercial version. Later on in the season, a three-chamber incinerator—I think we will come to the same levels of effluents that you achieve with this type of incineration in the United States within our own borders. There is one big difference, though. What is not too much of a problem here in the pristine Antarctic environment is a big problem. So our incinerator will be instrumented to find out what is really coming out, and we intend to take further measures to clean up the emissions that will come from that device.

Mr. GILCHREST. Well, are the other countries in the area—

Dr. WILKNISS. I'm sorry, I didn't answer your question about the ash.

Mr. GILCHREST. About the ash, right.

Dr. WILKNISS. It will be retrograded to the United States.

Mr. GILCHREST. I see. Are the other countries doing research down there beginning to put on line that same type of incineration?

Dr. WILKNISS. Yes. As a matter of fact, the Italian program has just an exemplary facility that our people have gone and looked at and studied, and I should say in the incineration and also in the waste treatment they're ahead of us.

Mr. GILCHREST. Thank you. Since the NSF is concerned with two very important things—research and how to keep the Antarctic in a pristine way—what are your thoughts down the road about looking for oil or other types of fossil fuels that might be—oil companies have been eyeing it for some time as far as their oil recovery is concerned. What are your thoughts about that? Should it ever be considered?

Dr. WILKNISS. The Congress has passed legislation, the Conte/Kerry bill, that prohibits U.S. citizens indefinitely to participate in any minerals activities, and the draft protocol that has been negotiated in Madrid two weeks ago also bans any mineral activities for 50 years. It only allows for scientific research in those areas, so our interest is to do the basic geophysics and geology that is needed for the understanding of the earth, the plate tectonics theory. You might have read that our scientists have come up with a new way of putting the earth together, and Antarctica used to be the neighbor of the United States. So we're looking at very basic problems, and we're not interested in the resource activities, and we cannot be by law.

Mr. GILCHREST. Thank you. Could you very briefly explain to me the importance of research in bottom water?

Dr. CORELL. That's a very good question. The way in which much of the world's oceans move, the circulation, is driven by what we call bottom or deep water formation, and both in the Antarctic and the Arctic, they are dominant factors in driving the circulation. It's a little easier to explain in terms of how it functions in the north, because it's a little simpler, and let me just give you a very quick picture of that.

Massive amounts of water move relatively slowly up the Atlantic, particularly on the eastern side, and as it moves northward above the equator, heat is extracted. In fact, it is the dominant factor in keeping Europe much warmer at higher latitudes than is the case in the western hemisphere. As it reaches the North Atlantic, it is the coldest water can be, and it is the most saline—the saltiest—it can be, and that makes that water extremely dense. When that water is that dense, it literally sinks, and in that sinking process, the energy contained in that sinking process is prodigious. It is incredible. And as a consequence, it is sort of a pump. It sort of pulls down and draws water up through the Atlantic.

Well, similar processes occur in and around the Antarctic, and those two factors combined are a major factor driving what Dr. Wally Broecker describes as the ocean conveyor, which is the major current structure that moves water around the planet. Well, when water moves, it carries energy with it, as is exemplified by the warming that this current provides to Europe. If that structure were to change, as it did about 11,000 years ago, you could have—and did have in those times—rather substantial cooling. In other words, that movement provides, in the case of Europe, a heating effect.

So it's a dominant factor in global environmental conditions, global climate change, and the stability of that major current structure, which reaches all the way into the Pacific and through the Indian Ocean and so forth, is tremendously important, and those processes occur in high latitude regions, both in the north and south.

Mr. GILCHREST. Thank you. Thank you, gentlemen.

Thank you, Mr. Chairman.

Mr. BOUCHER. The Chair thanks the gentleman and again expresses thanks to both of our witnesses from the National Science Foundation this morning. We'll look forward to receiving further

written statements from you concerning the legislation under consideration.

Dr. CORELL. Thank you, Mr. Chairman. We're delighted to have had the chance to be here.

Dr. WILKNISS. Thank you very much, Mr. Chairman.

Mr. BOUCHER. Thank you.

The Chair now welcomes the second panel of witnesses this morning. The representatives from The Antarctica Project, the Environmental Defense Fund, and Greenpeace all have been very active in focusing public attention on the need for greater efforts in the preservation of the Antarctic environment. They are also very knowledgeable about a variety of current activities on behalf of various nations that maintain a presence there.

So we welcome this morning Evelyn Hurwich, the Associate Director and Counsel of The Antarctica Project; Mr. Bruce Manheim, Attorney and Scientist for the Environmental Defense Fund; and Susan Sabella, Antarctic Legislative Coordinator for Greenpeace. Without objections, your prepared statements will be made a part of the record. We'll be pleased to receive your oral summaries.

Ms. Hurwich, we'll be glad to begin with you.

**STATEMENT OF EVELYN M. HURWICH, ASSOCIATE DIRECTOR
AND COUNSEL, THE ANTARCTICA PROJECT, WASHINGTON, D.C.**

Ms HURWICH. Thank you, Mr. Chairman.

I represent The Antarctica Project. I'm the Associate Director and Counsel for the project, which is a non-profit here in Washington. We serve as the secretariat for a coalition of groups—the Antarctic and Southern Ocean Coalition—of over 200 groups in 49 countries around the world, and we're all fully committed to the protection of Antarctica as a wildlife reserve and wilderness area of tremendous scientific and ecological importance.

I'm pleased to present this testimony today on behalf of several groups, including Cetacean Society International, Friends of the Earth, the Humane Society of the U.S., National Audubon Society, Natural Resource Defense Council, National Wildlife Federation, Sierra Club, Sierra Club Legal Defense Fund, The Wilderness Society, and the World Wildlife Fund, as well as the many wildlife of the Antarctic. We wish to commend the subcommittee for its attention to environmental policy issues in this remote but important region of the world and to thank you for holding this hearing today.

Since or earlier testimony before you in July of last year, several significant events have transpired, including the passage of legislation that Dr. Wilkniss referred to—the Conte bill. This bill prohibits U.S. nationals from engaging in mineral resource activities in Antarctica and also states the sense of Congress that the Secretary of State should enter into negotiations to conclude one or more new international agreements within that treaty system. In the act, Congress specifically called for a ban—an indefinite ban or prohibition—on mineral resource activities by all parties. Given the recently completed special consultative meeting in Madrid which produced an important accord on environmental protection, including a mining ban, this hearing is very timely.

Last month in Madrid, the parties continued work that they began in Vina del Mar, Chile, and as I say, they made a historic move by including the minerals ban in the agreement that came out of the meeting. They agreed to the draft text of a new protocol on environmental protection. The package the parties took home to their capitals following nine days of intense negotiations also included four protection annexes that you referred to. By the closing of the meeting, the parties agreed to take this home and come back in mid-June with the intent to sign the final act of the protocol on June 23, the 30th anniversary of the Antarctic Treaty. It remains to be seen if the United States is going to support this new protocol, and we urge this committee and members of Congress to help further along U.S. support for the protocol.

The protocol prohibits all minerals activities other than scientific research, including prospecting, exploration, and development. Following a 50-year prohibition, the ban could be lifted or amended by the affirmative vote of three-quarters of the treaty parties that would include all the present parties—the 26 present voting parties. Until such time as a replacement legal regime governing minerals activities in Antarctica came into effect, the prohibition would remain in force. This was included so that no legal void would exist should the parties decide at some future time that minerals activities would be found acceptable.

The new protocol also contains important protections for the environment which are lacking under the present system, including the establishment of a Committee for Environmental Protection, and the four annexes to the protocol strengthen the regulation of environmental impact assessment, waste disposal, marine pollution, and the conservation of the Antarctic flora and fauna. Additional annexes were discussed in the areas of protected areas, tourism, and liability but remain to be further developed and finalized.

We consider the Madrid protocol to be fully consistent with the letter intent of the U.S. law, and we view it as furthering U.S. interests by imposing the same prohibition on other parties that the U.S. nationals are already subject to under the Conte bill. However, its success is dependent on the support of all participating countries, particularly the U.S. and the U.K., which have been the hold-outs as far as wanting to keep the minerals option open.

Last week, Prime Minister John Major made a positive statement welcoming the Madrid protocol and essentially giving U.K. approval that approval would be pending on the protocol. The United States, on the other hand, hasn't indicated any willingness to accept the pact, which is quite disturbing to us and ironic in view of that Bush, when he signed the Conte bill, promised that the U.S. would be a leader in this respect, and we clearly are not.

The Madrid agreement, although not perfect, we feel provides a solid foundation for protection of the Antarctic environment. One notable gap is as far as liability goes, and I've attached an appendix to our statement, which is the ASOC submission to the treaty for a liability annex.

The subcommittee has asked for views on the adequacy of its draft bill and the suitability and likely effectiveness of its provisions. I have detailed recommendations in the written testimony, and I'll summarize a few points now for you.

Our fundamental concern with regard to the draft text is that the National Science Foundation we do not feel has the confidence to be the sole or even the primary environmental regulatory agency in the Antarctic. Any regulatory function undertaken should be in consultation with other agencies with greater environmental and regulatory experience, such as the EPA, NOAA, and several other agencies. The draft legislation authorizes NSF as virtually the sole regulatory authority in the Antarctic, and in this respect we find it seriously deficient.

Further, we are very glad to hear Dr. Corell affirming the intent of the committee that all Antarctic activity carried on by U.S. nationals are conducted in no less a responsible fashion than they would be here at home. However, we believe the only way to accomplish this is to actually require compliance with U.S. environmental laws. Of these, NEPA—the National Environmental Policy Act—would be most significant. Section 13 on environmental assessments of the bill does not contain provisions that would ensure protection at least in its equivalent to NEPA, nor does it match the breadth of protection envisioned by the annex on environmental impact assessment recently drafted in Madrid.

Finally, several other statutes should be applied to the Antarctic. Among these are the Clean Water Act, the Clean Air Act, the Resource Conservation and Recovery Act, Coastal Zone Management Act, and Toxic Substance Control Act, all of which were either found not to apply to the Antarctic or were not covered in NSF's legal report on implementation of their strategy for compliance with environmental law in the Antarctic. We believe an objective review to determine the likely scope of extended application of these statutes is essential to protection of the Antarctic, and we recommend that Congress initiate such a review. We believe that this would indicate the necessity of extension of these statutes.

Likewise, we wholeheartedly urge the inclusion of a citizen suit provision, without which public participation would be hampered in ensuring the proper enforcements of statutes newly applied to the Antarctic. With regard to enforcement, section 9 has the same flaw in particular that the draft legislation suffers generally, in our view. NSF is given virtually exclusive regulatory authority. It is allowed to police itself as the sole enforcement agency. As has been clearly documented by my colleague, Bruce Manheim, in his report "On Thin Ice" and by Greenpeace's actual monitoring on the ice, NSF has failed to comply with a number of authorities governing environmental protection in Antarctica. Its track record does not merit the confidence implicated by this draft legislation.

In addition, the time lines detailed in section 4 and 10, which extend as late as 1996 in some cases, are unacceptable. We know what many of the problems are, and we don't feel we need to wait that long to start to address them. We also don't believe that Congress should provide NSF with an extension for delinquent compliance with pre-existing duties.

In conclusion, I want to express our willingness to work with you on the further development of effective protection for the Antarctic. In this regard, we urgently recommend to Congress the following steps: that a joint resolution be passed expressing the sense of Congress that the text of the Madrid protocol is fully consistent

with the Conte bill and strongly urging the Administration to accept the protocol for signature in Madrid next month. The protocol would establish an indefinite prohibition on mining and create the needed comprehensive framework for protection of the Antarctic environment.

Secondly, we hope you will closely monitor international developments and the role of the United States in Madrid next month and at the regular Antarctic Treaty meeting in Bonn in October 1991. We hope that you'll send Congressional observers to these meetings and that you will hold on the introduction of substantive legislation until then in order to assure the most effective and comprehensive protection possible for Antarctica by implementing domestic legislation that is consistent with and, where appropriate, augmenting our international obligations.

Thank you.

[The prepared statement of Ms. Hurwich follows:]



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14 May 1991

STATEMENT OF EVELYN M. HURWICH
to the
HOUSE SUBCOMMITTEE on SCIENCE
of the
COMMITTEE on SCIENCE, SPACE, AND TECHNOLOGY
concerning the
NATIONAL SCIENCE FOUNDATION
ANTARCTIC ENVIRONMENTAL PROTECTION ACT OF 1991

I.	Introduction.....	1
II.	Summary.....	3
III.	Background.....	8
	A. Antarctica: A Wilderness Issue.....	10
	B. Scientific Potential.....	11
IV.	Analysis of the National Science Foundation Antarctic Environmental Protection Act of 1991.....	13
	A. Environmental Standards.....	14
	B. Application of U.S. Environmental Laws.....	15
	C. Prohibited Acts and Required Practices.....	16
	D. Enforcement.....	17
	E. Environmental Audit.....	18
V.	Conclusion.....	18

Appendix 1: ASOC Annex on Liability and Compensation for
Antarctic Activities

14 May 1991

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ANTARCTIC ENVIRONMENTAL PROTECTION ACT OF 1991

I. Introduction

I am Evelyn M. Hurwich, Associate Director and Counsel for The Antarctica Project. The Antarctica Project, a non-profit organization in Washington, D.C., serves as the northern hemisphere secretariat for the Antarctic and Southern Ocean Coalition (ASOC), which includes more than 200 environmental and conservation organizations in 49 nations around the world. ASOC members are committed to the full and permanent protection of Antarctica as a wildlife sanctuary and wilderness area of enormous scientific and ecological importance, devoted to peaceful purposes, and abundant in aesthetic, spiritual, scenic and other values. We are also unanimous in the view that any mining or oil drilling in the fragile Antarctic environment would

be incompatible with such protection.

I am pleased to present this statement on behalf of The Antarctica Project, American Cetacean Society, Cetacean Society International, Friends of the Earth, The Humane Society of the U.S., Monitor Consortium, Monitor International, National Audubon Society, Natural Resource Defense Council, National Wildlife Federation, Sierra Club, Sierra Club Legal Defense Fund, The Wilderness Society, World Wildlife Fund, and the myriad wildlife of the Antarctic. We wish to commend the Subcommittee for its attention to environmental and policy issues of vital importance to this remote region of the world.

We thank Representative Boucher and the other members of the Science Subcommittee for holding this hearing concerning Antarctic environmental protection. Since our earlier testimony before you in July of last year concerning Antarctic minerals policy, several significant events have transpired, including the passage of legislation, which prohibits U.S. nationals from engaging in Antarctic mineral resource activities, and states the sense of Congress that the Secretary of State should enter into negotiations to conclude one or more new international agreements within the Antarctic Treaty System. In the Act, Congress specifically called for an agreement to "prohibit or ban indefinitely" mineral activities by all Parties. [Public Law 101-594] Given the recently completed Antarctic Treaty Special Consultative Meeting in Madrid, which produced an important

accord on environmental protection, including a mining ban, this hearing is most timely.

II. Summary

Many of the organizations that have led the effort to protect Antarctica have been working together through the Antarctic and Southern Ocean Coalition (ASOC) for more than a decade. Despite environmental opposition to the negotiation of an agreement to open the region to commercial minerals activity, the Convention on the Regulation of Antarctic Mineral Resource Activities was agreed to in 1988. But in 1989, Australia and France together opposed it, which triggered a world-wide governmental shift towards a minerals ban. The Minerals Convention is now effectively a dead letter.

Growing international support for protection of the region, which is recognized as the finest natural laboratory on the planet and an important wildlife sanctuary, has led to a series of meetings during the last few years aimed at the negotiation of a comprehensive environmental protection agreement for Antarctica, among the 39 Antarctic Treaty nations.

Last month, in Madrid, Spain, the Antarctic Treaty parties continued the work they began at the first session of the Special Consultative Meeting on the Environment, which was held November - December 1990 in Vina del Mar, Chile, and made a historic move to ban all minerals activities in the Antarctic. They agreed to

the draft text of a new Environmental Protocol to the Treaty, which includes a minerals prohibition. The package the Parties took home to their capitols for acceptance, following nine days of intense negotiations, also includes four protection Annexes. By the closing of the Madrid meeting, the Parties had agreed to return in mid-June with the intent to sign the Final Act of the Protocol on June 23, 1991, the 30th anniversary of the Antarctic Treaty. It remains to be seen if the U.S. will support the new Protocol, which is a milestone in Antarctic history.

The Protocol prohibits all minerals activities -- other than scientific research -- including prospecting, exploration and development in the Antarctic. Following an initial 50 year prohibition, the ban can be lifted or amended by the affirmative vote of three-quarters of the Treaty's Consultative Parties, a majority which must include all 26 of the current voting members. However, until such time as a replacement legal regime governing mineral activities is in force, the ban remains in effect. This ensures that no "legal void" will exist should the Parties collectively decide at some future date that such activities would be acceptable.

The new Protocol contains important legal protections for the Antarctic environment, which are lacking under the present Treaty System, including the establishment of a Committee for Environmental Protection. The four Annexes to the Protocol strengthen the regulation of environmental impact assessment, waste disposal, marine pollution, and the conservation of

Antarctic flora and fauna. Proposals for additional Annexes on protected areas, tourism, and liability were discussed, but remain to be fully developed and finalized.

We consider the Madrid Protocol entirely consistent with the letter and intent of U.S. law as articulated in the Antarctic Protection Act of 1990. We also view it as furthering U.S. interests by imposing the same prohibition on all Parties that U.S. nationals are already subject to. However, its success is dependent on the support of all participating countries, particularly the U.S. and U.K., the two principal countries that have continued to advocate for preservation of the mining option.

British Prime Minister John Major released the following positive statement last week in Parliament:

The Government warmly welcomes the outcome of the Madrid meeting and hopes that the draft Protocol tabled there will provide the basis for the comprehensive protection of the Antarctic environment which has always been the Government's objective.

Of particular importance are the provisions for a ban on mineral activity for fifty years, and mechanisms for a review of the ban after fifty years, or before if everyone agrees. The results of these provisions would be that there can never be mining in Antarctica unless all the present Consultative Parties agree.

The U.S. has thus far not announced any willingness to accept the pact. This is disturbing, and particularly ironic in view of the legislation, which was signed by President Bush in a public ceremony at which he promised that this country would be a leader in forging new protection agreements for the Antarctica.

In a very real sense, this is a key step in the long-term effort to permanently protect Antarctica as the planet's first "World Park." When environmentalists started working in favor of a minerals ban and a World Park more than 10 years ago, we were called dreamers. Now, the Antarctic Treaty governments are transforming that vision into a reality that offers hope for the fate of the earth. The Madrid agreement, although not perfect, lays a solid foundation for the protection of the Antarctic environment.

One notable gap in the Protocol is a liability framework that would deter polluters and require compensation for damage to the environment and necessary restoration action. ASOC put on the table at the Madrid meeting a proposed liability annex, and will be urging governments to adopt it at a future meeting.

Key points include:

- State Parties are strictly liable for environmental damage to the Antarctic ecosystem resulting from their activities or those of their nationals;
- State Parties are liable to compensate for injuries arising out of the above, except when caused by an unforeseeable natural disaster, or armed conflict or an unavoidable act of terrorism;
- State Parties have a duty to provide full compensation where liability attaches in accordance with the above;
- Where damage to the Antarctic ecosystem has occurred, and a duty to compensate arises, the Committee for Environmental Protection prepares a Damage Assessment;
- An Antarctic Environmental Compensation Fund is established and dedicated solely to providing compensation in instances where no other source of compensation is

available, or where all other sources have been exhausted;
and

- The Annex is subject to mandatory dispute settlement procedures.

The ASOC Annex on Liability and Compensation is attached as Appendix 1.

The Subcommittee has asked for views on the adequacy of its draft bill and the suitability and likely effectiveness of its provisions. A general assessment of the proposed legislation and detailed recommendations follow in Section IV of this statement.

We urgently recommend to Congress the following steps:

1. Pass a Joint Resolution expressing the sense of Congress that the text of the Madrid Protocol to the Antarctic Treaty on Environmental Protection is fully consistent with the Antarctic Protection Act of 1990, and strongly urging the Administration to accept the Protocol for signature when the Treaty members reconvene in Madrid next month. The Protocol would establish an indefinite prohibition on minerals activity and create the needed comprehensive framework for protection of the Antarctic environment.

2. Closely monitor international developments and the role of the U.S. in Madrid next month and at the XVI Antarctic Treaty Meeting in Bonn in October. Send Congressional observers to these meetings. Hold on the introduction of substantive legislation until then in order to achieve the most effective and

comprehensive protection possible for Antarctica by implementing domestic legislation consistent with, and where appropriate augmenting, our international commitments.

III. Background

The Antarctic Treaty entered into force in 1961, the same year the Berlin Wall sharply divided Europe and the world. At the height of these Cold War tensions, the Antarctic Treaty succeeded in establishing a tenth of the Earth's land surface as a demilitarized and nuclear-free zone. Antarctica, a land devoted to peaceful uses only, became a global laboratory where countries could jointly pursue scientific research. The Antarctic Treaty is recognized as a landmark agreement that has effectively channeled competing national interests into an atmosphere of unprecedented international cooperation.

Antarctica plays a vital role in the earth's atmospheric and oceanic systems. Any major change in the Antarctic environment could have unpredictable impacts on the climates and environments of other parts of the earth. The region holds many secrets of the earth's past. It may be the best monitoring zone for global pollution, a vantage point from which to observe the degradation of the earth's natural systems, and hopefully their recovery. In this context, Antarctica provides a unique platform for carrying out research on climate change and other global phenomena.

Constituting about 10 percent of the earth's land and water

area, Antarctica is a great wilderness. Its land mass of approximately 5.4 million square miles is mostly covered by an ice sheet about two miles thick. Less than two percent of that land area is exposed, and provides critical habitat for over 100 million birds, including seven species of penguins, and millions of marine mammals.

The surrounding Southern Ocean is rich in planktonic species, and among the most biologically productive in the world. It is home to one of the earth's most unique, highly adapted, and specialized ecosystems. Its richness supports economically important fisheries and a number of endangered species of whales that migrate into it. Nutrients from the Southern Ocean are carried thousands of miles to other areas of the ocean. It also is the site of the Antarctic Convergence Zone, where colder waters of the Antarctic sink below the warmer waters of the Indian, Pacific and Atlantic Oceans, providing the environment for diverse and abundant forms of life.

The state of knowledge about Antarctic ecosystems is still rather limited. Thus, our ability to predict accurately the possible impacts of various human activities is commensurately limited. A central theme of all efforts for protection and conservation in the region is the need for greatly increased research on all aspects of Antarctica's ecological structure. This type of research is an essential precondition for sound management policy and decision making.

A. Antarctica: A Wilderness Issue

Antarctica is a wilderness that must be preserved. The U.S. is a leader in developing the legal concepts for protecting wilderness. For example, the Wilderness Act of 1964 defines a wilderness as "an area where the earth and its communities of life are untrammelled by man...where man himself is a visitor who does not remain...and which generally appears to have been affected primarily by the forces of nature with the imprint of man's work substantially un-noticeable...." The U.S. should apply this wilderness expertise to our Antarctic affairs.

The Antarctic presents policy and decision makers with the opportunity for wilderness conservation on a hitherto unequaled scale. The world's largest terrestrial national park, in Greenland, covers only 270,200 square miles (700,000 square kilometers), and the Great Barrier Reef Marine Park--the world's largest marine park--covers a mere 115,800 square miles (300,000 square kilometers). The sheer size of the Antarctic, its remoteness, and the lack of clearly defined national jurisdiction, place the wilderness reservation of this region in a class of its own.

One aspect of "wilderness" in the Antarctic is the status of animal populations. Antarctica has the largest populations of wildlife left in the world, tens of millions of marine mammals and birds that are free to migrate, feed and breed as they have

in their natural state for countless generations. If the whaling moratorium can be fully implemented, Antarctica will be the last great wildlife sanctuary in the world. We note that research is being done on Antarctic wildlife. There also are many reported incidents of base personnel harassing wildlife and disrupting their habitat or feeding activities. Our members are concerned that all Antarctic living organisms are treated humanely, in all their interactions with humans.

B. Scientific Potential

At present, Antarctica is a global scientific laboratory of immense value. The near pristine nature of the region provides a baseline against which we can measure pollution in more populated regions. The information locked in its ice cap helps us understand the climatological history of our planet. Many simple terrestrial and aquatic ecosystems found in Antarctica are useful as models to track key biological processes both at the population and community levels.

Antarctica is also of critical importance to research on ozone depletion and the greenhouse effect. The International Geosphere-Biosphere Programme (IGBP) has been established under the auspices of the International Council of Scientific Unions. IGBP describes the importance of the polar regions in this way:

The polar regions are very sensitive to changes in the global environment and may act as

"warning signals" to changes in the total energy flux into our Earth and to changes in the atmosphere. The polar regions also act as global historians, maintaining records of past global environmental conditions within their permanent ice fields.

The IGBP is co-ordinating international research efforts in polar regions, focusing on prime indicators of global change: ozone concentrations, ice cores, polar ice levels, and polar temperatures. It is important that such phenomena be studied without interference from local sources of pollution.

The potential of the Antarctic for extremely important research on global problems is not being fully utilized. Our ability to manage and control increasingly varied and intense human activities and their impacts on natural systems is dependent on a much better understanding of the interactions of fundamental components of the global ecosystem. Depletion of the ozone layer, global marine pollution, long-range transfer of pollutants, and climate change phenomena require coordinated studies on a global, interdisciplinary, multi-institutional basis.

These programs require increasingly sophisticated field instruments, research techniques, computers and satellite capabilities, which are beyond the resources of most nations and any individual research institution. In order to fully realize

the benefits of increased understanding of the earth and its systems now open to us, careful long-term planning and allocation of financial and intellectual resources are required, as well as continuity of support for these large global research and monitoring programs.

The new Protocol will advance the missions of the National Science Foundation, the National Oceanic and Atmospheric Administration, NASA and other agencies conducting research in the Antarctic. It constitutes a most significant step toward ensuring the near-pristine nature of the region will be protected in perpetuity so that its scientific potential can be fully realized.

IV. Analysis of the National Science Foundation Antarctic Environmental Protection Act of 1991

As indicated in the above sections, we believe that the best way to preserve the delicate and irreplaceable Antarctic ecosystem is to support the Madrid Protocol and declare the entire Antarctic continent a world nature park devoted to peace and science. The draft National Science Foundation Antarctic Environmental Protection Act of 1991 eloquently supports this policy in its finding that "the national policy of the United States should be to take all steps necessary to ensure that Antarctica's lands and resources are managed and protected in a manner that preserves Antarctica's unique resources, values, and environment, as well as its value for scientific research, for

the benefit of present and future generations of peoples of all nations."

However the National Science Foundation (NSF) does not have the competence to be the environmental regulatory agency for the Antarctic. Any regulatory function it undertakes should be in consultation with other agencies with environmental and regulatory expertise, such as EPA, NOAA, etc. The draft legislation authorizes NSF as virtually the sole regulatory authority in the Antarctic and in this respect is seriously deficient.

A. Environmental Standards

Section 4 of the draft bill sets forth provisions, including deadlines, for the issuance of pollution control regulations and permits, but these regulations and a permit program were already authorized by the Antarctic Conservation Act of 1978. Why should Congress provide NSF an extension to 1993 and 1994 for delinquent compliance with pre-existing regulatory duties? We cannot endorse these provisions as drafted.

Section 4 also requires in subparagraphs (b)(2) and (3), that in the issuing of such regulations and permits, that at least the "same degree of environmental protection as that provided for by the environmental laws of the United States" shall apply, "consistent with special safety considerations and operational requirements" of the Antarctic environment. What

might constitute special safety considerations and operational requirements are not defined. Provision should be made to at least tighten up, if not close, these potential loopholes.

B. Application of U.S. Environmental Laws

The Antarctica Project applauds the intent of the Committee to ensure that all Antarctic activities carried out by U.S. nationals are conducted in no less a responsible fashion than are comparable activities on American soil.

However, we assert that the only way to accomplish this is to actually require compliance with U.S. environmental laws. Of these, the National Environmental Policy Act of 1969 (NEPA) is critically important.

Section 13 on Environmental Assessments does not contain provisions that would ensure protection at least equivalent to NEPA. Nor does Section 13, subparagraph (b)(2) match the breadth of protection envisaged by the Annex on Environmental Impact Assessment recently drafted by the Antarctic Treaty Parties.

The Wilderness Act and Endangered Species Act and quite a number of other statutes should be applied to the Antarctic. Among these are the Marine Mammal Protection Act, Clean Water Act, Clean Air Act, the Resource Conservation and Recovery Act, the 1972 Coastal Zone Management Act, and the Toxic Substances Control Act of 1976. Detailed analysis is required in order to

determine the likely scope of the extended application of these statutes. An objective review, which we recommend that Congress initiate, will indicate the necessity of such an extension. We maintain that this is a requisite step toward comprehensive environmental protection of the Antarctic.

Likewise, we wholeheartedly urge the inclusion of a citizen suit provision. Without such a clause, adopted in most U.S. environmental legislation, public participation would be hampered in ensuring the proper enforcement of the statutes newly applied to the Antarctic.

C. Prohibited Acts and Required Practices

Section 5(4) prohibits the dumping of waste at sea except in accordance with permits issued by the Environmental Protection Agency...and by the Director of NSF. This mandates a redundancy we see no measurable value in. The EPA permit should be exclusive.

Parts of Section 6 are subject to the same comments made above with regard to the applicability of U.S. laws to the Antarctic. Incineration practices, if permitted at all, should at least meet the standards of the Clean Air Act. Similarly, the discharge of human wastewater should be subjected to standards at least as stringent as those in effect domestically, if no more so because of the delicate environmental balance in Antarctica.

Section 6(e) pertaining to a hazardous and toxic pollutant plan should be broadened to include application to oil spills, a more likely pollutant danger in the Antarctic. U.S. standards that should apply in the Antarctic are contained in the Oil Pollution Act of 1990. We recommend that the Committee establish a role for the Coast Guard, which has the expertise that NSF lacks in the implementation of such laws pertaining to pollution prevention and response action. We also recommend coordinating efforts with the Merchant Marine and Fisheries Committee, which has under referral H.R. 1921, a bill to amend the Oil Pollution Act of 1990 to protect the environment of Antarctica from oil spills.

D. Enforcement

Section 9 has the same flaw in particular that the draft legislation suffers from generally -- NSF is given virtually exclusive regulatory authority. It is allowed to police itself as the sole enforcement agency. As has been clearly documented by my colleague Bruce Manheim of the Environmental Defense Fund in the report, "On Thin Ice", and by Greenpeace's actual monitoring on "the Ice", the NSF has failed to comply with a number of authorities governing environmental protection in Antarctica. Its track record does not merit the confidence implied by this draft legislation.

E. Environmental Audit

Again, other agencies with environmental, technical, and regulatory expertise, such as the EPA and the Coast Guard, must be given more of a role in order to obtain a well-conceived and effective environmental protection program for Antarctica. The audit reports should be circulated to all appropriate agencies and other organizations, including nongovernmental organizations, for comment.

The timelines detailed in Section 10, which extend as late as 1996, are also unacceptable. We already know what many of the problems are; we needn't wait five years to address them.

V. Conclusion

Antarctica is in a delicate balance. Its creatures are uniquely adapted to the difficult conditions of the region and to one another. We commend those governments and politicians that are leading the effort to set aside the Antarctic as a wildlife and wilderness sanctuary of unparalleled scope, a "land of science" for all nations to use cooperatively, and a permanent zone of peace.

It is often said that "the best is the enemy of the good", the implication being that some of the best environmental proposals are too idealistic. But we submit that it is in reaching for the best that humankind is ultimately advanced. In this respect we salute the far-sightedness of the drafters of the

Antarctic Treaty, who had the courage to ban military activities in the region and the wisdom to lay a foundation for Antarctica to be used primarily for science.

Whether humankind can now respond with the intelligence, moral integrity and vision necessary to meet the challenge of planetary survival and well-being, is at stake in Antarctica. As we approach the new millennium, we call on all policy makers to summon their courage and wisdom in defense of Antarctica for the benefit of present and future generations of all living beings.

In this context, the U.S. should welcome the draft accord negotiated in Madrid, and work hard, in concert with the other members of the Antarctic Treaty, to put its far-reaching provisions into operational effect, as well as to move aggressively to fill the remaining gaps, such as liability. We urge the Congress to do everything it can to ensure that the U.S. signs the Protocol in Madrid on June 23. A Joint Resolution expressing this sense of the Congress would be an important first step. We would hope that, given the virtual unanimity in the Congress last year in enacting the Antarctic Protection Act of 1990, this could be done expeditiously, in the next few weeks.

Mr. BOUCHER. Thank you, Ms. Hurwich.
Mr. Manheim, we'll be pleased to hear from you.

**STATEMENT OF BRUCE MANHEIM, ATTORNEY AND SCIENTIST,
ENVIRONMENTAL DEFENSE FUND, WASHINGTON, D.C.**

Mr. MANHEIM. Thank you, Mr. Chairman.

I'd like to echo many of the comments made by Ms. Hurwich. I'd also like to simply summarize my written statement and, in the process of summarizing that statement, respond to some of the questions and some of the answers that the Government provided earlier.

EDF has maintained a long-standing interest in the protection of Antarctica's pristine environment and its vast assemblage of Antarctic marine life. Because the U.S. accounts for a very large number of activities in Antarctica, principally in the form of either scientific research or tourism, we have focused specifically on those activities and the extent to which they're subject currently to U.S. law.

In two reports issued by my organization, one in August 1988 and another in January of 1989, we chronicled the efforts and, to some extent, the failure thereof of the National Science Foundation to both regulate its own waste disposal activities in Antarctica as well as the activities of U.S. tourist companies that operate cruises in Antarctica. On the basis of that review and current and ongoing efforts by the National Science Foundation, EDF opposes introduction of this legislation. Rather, we believe that this committee and the Congress should await the Administration's submission of the Madrid protocol, and in the process of implementing that protocol, the Congress should vest agencies with particular environmental expertise with protection of Antarctica.

One of the points that came up earlier was sort of related to the timing of the submission of this protocol, and I think you, Mr. Chairman, suggested that it would be prudent to introduce the legislation now rather than wait for two to four years for this agreement to enter into force. My view is that we should wait until the Administration submits the agreement to the Hill, but we need not wait for other countries to ratify the agreement before the U.S. can in fact adopt implementing legislation for the Madrid agreement, and I think that by example, if nothing else, strong implementing legislation adopted by the United States soon rather than later will serve as an example for other countries to implement this Madrid protocol.

Specifically in terms of timing, as I understand it, the Madrid protocol will be signed off, assuming the United States and other countries agree to it, in mid-June and shortly thereafter will be submitted to the Congress for approval. It should be at that time that this bill, if you desire to introduce it, as well as other legislation introduced by other members of Congress should be considered in the implementation of this Madrid agreement.

With respect to the specifics of this bill, we have some serious concerns about the deadlines established in it. In fact, some of the deadlines, for example, with respect to the issuance of pollution control regulations, even exceed those that have already been im-

posed by the National Science Foundation on it. So, for example, in just last month's semi-annual Federal regulatory agenda, NSF announced that it would finalize its pollution control regulations by December of 1991, yet this legislation would not require the issuance of those regulations until June of 1993 for Federal agencies and September of 1993 for private parties, and then, in fact, implementation for those private parties a whole year later. We can't wait that long. We've waited, quite frankly, Mr. Chairman, since 1978 with passage of the Antarctic Conservation Act. It's already 13 years since those mandatory regulations are overdue, and EDF cannot support a further extension of time beyond even what NSF has already indicated it's willing to issue these regulations by.

With respect to some of the discussions concerning tourism, there was a question, I think, put to Dr. Corell regarding whether NSF or some other agency—the Department of Commerce, for example—should be vested with authority to regulate tourism in Antarctica, and maybe it's unfair for me to paraphrase Dr. Corell's response, but as I understand it, he suggested that because the U.S. Antarctic Program has essentially exclusive jurisdiction over activities in Antarctica that they might—though they haven't necessarily decided to do so—oppose that legislation because it does confer authority on NOAA, not NSF, to regulate tourist activities in Antarctica. That, in fact, as I understand it, was the position of the National Science Foundation last year in its opposition to Mr. Conte's proposed legislation that would have vested the Department of Commerce with authority over tourist activities.

My response, Mr. Chairman, is that there are now already two laws that Congress has enacted that do specifically vest the Department of Commerce with regulation of commercial activities in Antarctica. There's the Antarctic Marine Living Resources Convention Act, adopted in 1984, that vests NOAA with authority to control commercial fishing activities by U.S. citizens in Antarctica, and then just last year the Department of Commerce was vested with authority to specifically prohibit Antarctic mineral resource activities by U.S. citizens in Antarctica.

With respect to tourism, I don't see any difference or any need not to also vest the Department of Commerce with that sort of regulatory authority, and, quite frankly, in the end I think it will advance NSF's primary mission of perpetuating scientific research by really giving the agency that responsibility and not requiring it to deal with matters that it is not particularly well-suited to regulate.

And finally, with respect to the question of environmental impact assessment in Antarctica and the application of the National Environmental Policy Act to Antarctica, EDF believes that NEPA does apply to Antarctica; that the Executive Order 12114 specifically requires the National Science Foundation to comply with the National Environmental Policy Act for its Antarctic activities. Unfortunately, although NSF claims in its testimony—in its written testimony—that the procedures it has issued under Executive Order 12114 are quite similar to those required under NEPA, that simply is not accurate. In fact, the Council on Environmental Quality, in its comments on the National Science Foundation's proposed procedures implementing Executive Order 12114, stated that their procedures fall far short of implementing NEPA

or the CEQ regulations. Moreover, CEQ went on to point out that those proposed procedures which are currently being utilized also fall short of both the Executive Order and certain provisions of the international assessment procedures that are currently being developed.

Finally, with respect to Mr. Gilchrest's comment regarding incinerators, the Government indicated earlier that wastes could not be removed from Antarctica; they simply could not be returned to the United States under USDA regulations, specifically the Animal, Plant, and Health Inspection Service. However, in fact, wastes can be returned from Antarctica to the United States as long as they are incinerated prior to their introduction to the United States.

I'll stop there and be happy to respond to any questions. Thank you.

[The prepared statement of Mr. Manheim follows:]

STATEMENT

OF

BRUCE S. MANHEIM, JR.
ATTORNEY AND SCIENTIST
ENVIRONMENTAL DEFENSE FUND

BEFORE THE

SUBCOMMITTEE ON SCIENCE

OF THE

HOUSE COMMITTEE ON SCIENCE, SPACE AND TECHNOLOGY

ON THE

NATIONAL SCIENCE FOUNDATION
ANTARCTIC ENVIRONMENTAL PROTECTION ACT OF 1991

MAY 14, 1991

Mr. Chairman and Members of the Subcommittee:

Thank you for the opportunity to appear before the Subcommittee to consider the "National Science Foundation Antarctic Environmental Protection Act of 1991." The Environmental Defense Fund ("EDF") has maintained a longstanding interest in protection of Antarctica's pristine environment and its vast assemblage of marine life. Although Antarctica may be the size of Mexico and the United States combined, impacts to the Antarctic environment from human activities there should not be underestimated. Indeed, while the continent's ice sheet is virtually barren of native terrestrial life, small ice-free areas along the coast and nutrient-rich waters surrounding the continent provide essential habitat for penguins, seals, whales, and other marine species. It is principally within these areas, which only constitute 1-2% of the continent, that human activities within Antarctica have also been pursued. Such activities have been especially concentrated within certain regions of Antarctica, such as the Antarctic Peninsula.

Currently, the United States accounts for the largest number of nationals working within or visiting Antarctica. Almost half of all summertime scientific and logistic personnel that work in Antarctica are Americans. At the same time, virtually all tourist expeditions to Antarctica are sponsored by companies based in the United States and those tours consist predominantly of U.S.

citizens. In recognition of the large number of U.S. citizens that travel to Antarctica each year, EDF has focused specifically on the impacts that may arise from their activities. In August 1988, EDF released a report (*On Thin Ice: The Failure of the National Science Foundation to Protect Antarctica*) that found that U.S. scientific and logistic activities failed to comply with various international rules and domestic environmental laws. Subsequently, EDF issued an additional report (*Paradise Lost: The Need for Environmental Regulation of Tourism in Antarctica*) that focused on the impacts to Antarctic wildlife from a burgeoning U.S. tourist industry. That report called for creation of an effective regulatory scheme to govern U.S. companies sponsoring tours in Antarctica.

Based on EDF's review of the efforts of the National Science Foundation ("NSF") to govern these activities in Antarctica, and in light of ongoing international actions to secure comprehensive protection of the Antarctic environment, EDF opposes introduction of the "National Science Foundation Antarctic Environmental Protection Act of 1991." Rather, EDF believes that federal agencies, which maintain specific expertise on environmental matters, should be vested with authority for ensuring protection of the Antarctic environment. Such an arrangement would ultimately enhance NSF's primary mission of advancing scientific research by ensuring that Antarctica remains a pristine natural laboratory. As described more fully below and in the attachments to this

testimony, NSF has not responded adequately and quickly to issues such as pollution control, tourism, and environmental impact assessment in Antarctica. Unfortunately, nothing in the proposed legislation would address these problems and, in several important ways, the proposed bill even takes a step backwards.

For example, with respect to establishing a pollution control program in Antarctica, Section 4(a) of the proposed bill would require NSF to issue pollution control regulations by June 1, 1993 and to implement them for federal agencies by September 1, 1993 and for private parties by September 1, 1994. Yet, since passage of the Antarctic Conservation Act in 1978, NSF has been required to promulgate such regulations and it most recently indicated that these regulations would be issued by December 1991. In addition, assuming such regulations were issued pursuant to the proposed legislation, they would not necessarily extend U.S. environmental requirements to Antarctica. Section 4(b) of the proposed bill calls upon NSF to ensure that its regulations "provide at least the same degree of environmental protection" as that provided by U.S. environmental laws "consistent with special safety considerations and operational requirements of the Antarctic environment." That latter language potentially creates a sweeping loophole, as exemplified by the bill's treatment of human wastewater under Section 6(d). It is particularly troubling since it is apparently based on NSF's erroneous conclusion in December 1990 that it need

not comply with various U.S. environmental laws or Executive Order 12098 for its activities in Antarctica. (See Attachment I).

Section 5 of the proposed bill is equally troubling. Among other things, it would authorize NSF to permit the discharge of hazardous pollutants or "ice-staging" of wastes in Antarctica. Those practices resulted in the extraordinarily high levels of PCB's and heavy metals in bottom sediments of Winter Quarters Bay near McMurdo Station, and should be outlawed. In addition, this section conflicts with the authority of the Environmental Protection Agency ("EPA") to regulate certain waste disposal activities. For instance, Section 5(4) confers authority on NSF to permit ocean dumping of wastes in Antarctic waters even though EPA has jurisdiction over such activities under the Ocean Dumping Act. Moreover, while Section 5(3) authorizes NSF to regulate the transport of hazardous or toxic pollutants to Antarctica, a ban on such activities was recently adopted under the Basel Convention and that international agreement will almost certainly be implemented by EPA. Furthermore, Section 5(5) of the proposed bill would permit open pit burning of certain wastes at McMurdo Station until 1995. Yet, notwithstanding the inconsistency of that provision with the flat ban on open pit burning contained in the Resource Conservation and Recovery Act, NSF recently announced that it had decided to eliminate that illegal practice at McMurdo Station beginning in 1991.

The proposed legislation also falls short of preventing environmental impacts from a burgeoning tourist industry in Antarctica. Antarctica is now visited by thousands of tourists each year who wish to see the continent's pristine environment before it could be despoiled. While most tourists are seriously concerned about protecting Antarctica, their visits are often localized, repetitive, and frequently occur at breeding grounds for seals, penguins, and other seabirds. Such visits place additional stress on these species, and could cause animals to abandon their breeding sites or increase the vulnerability of their eggs and young to predation. In light of these impacts, EDF formally petitioned NSF in May 1990 to issue comprehensive regulations governing U.S. tourist activities in Antarctica. (See Attachment II). Although NSF never responded to EDF's petition, NSF officials indicated to Congress just last year that additional regulation of U.S. tourist activities was not necessary. As a result, NSF has already decided that further regulation of U.S. tourist activities is not necessary. Therefore, Section 12's call for a report by NSF on tourism and its directive that NSF issue regulations "as may be necessary and appropriate" will almost certainly result in no further action to address this problem.

Finally, with regard to environmental impact assessment for both governmental and non-governmental activities in Antarctica, the proposed bill is also problematic. Section 13 directs NSF to

issue regulations governing environmental impact assessment under Executive Order 12114 and the Antarctic Treaty by January 1, 1992. Such regulations would govern assessment of the impacts of any activity undertaken by any federal agency in Antarctica or any private entity receiving financial assistance from the U.S. government in connection with such activities. This provision is apparently based on NSF's incorrect assertion that the National Environmental Policy Act ("NEPA") does not apply to Antarctica and that E.O. 12114 establishes the only impact assessment requirements for Antarctica. Although the U.S. recently persuaded other Antarctic Treaty parties to adopt international impact assessment procedures and they are similar to those required under NEPA, NSF has already proposed guidelines under the Order (albeit a decade late) that fall far short of NEPA and are inconsistent with international assessment procedures. (See Attachment III). For the bill to extend these inadequate procedures -- and not NEPA -- to all federal agency activities in Antarctica is unacceptable.

In conclusion, EDF strongly opposes introduction of the "National Science Foundation Antarctic Environmental Protection Act of 1991" since it would substantially undermine environmental protection in Antarctica. In essence, the proposed bill would give NSF -- the principal U.S. polluter in Antarctica -- plenary authority to issue regulations governing its activities and to enforce such regulations against itself. Moreover, beyond the

defects described above, the bill does not afford other federal agencies any significant opportunities to review or even consult on NSF's actions. In addition, Section 14 of the proposed legislation seeks to shield NSF from any kind of judicial or administrative review of its actions. Reduced to its simplest form, the bill would empower NSF with virtually exclusive and unbridled authority to regulate the environmental impacts of U.S. activities in Antarctica. Given the importance of protecting the Antarctic environment as a pristine natural laboratory for scientific research, Congress should vest the environmental agencies -- not NSF -- with responsibility for protection of Antarctica.

ENVIRONMENTAL DEFENSE FUND

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August 25, 1989

Mr. Robert M. Andersen
Deputy General Counsel
National Science Foundation
1800 G Street, N.W.
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Dear Mr. Andersen:

This letter provides the comments of the Environmental Defense Fund (EDF) on the draft report entitled "A National Science Foundation Strategy for Compliance with Environmental Law in Antarctica." The National Science Foundation (NSF) solicited comments on that report in the Federal Register on July 18, 1989. 54 Fed. Reg. 30119. In that notice, NSF indicated that the report (1) determines which laws apply to Antarctic activities, (2) applies those laws to U.S. Antarctic Program activities to determine if NSF is in compliance, and (3) develops recommendations to bring NSF into full compliance with applicable laws and sound principles of pollution control, wildlife conservation and waste management. Although EDF is pleased that NSF's Office of the General Counsel (OGC) has finally completed this review, we believe that the report's conclusions are based on an overly narrow reading of U.S. law and that certain of its recommendations fall short of NSF's own stated objectives. The bases for these conclusions and our specific comments on the draft report follow.

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I. DETERMINING WHICH ENVIRONMENTAL LAWS APPLY IN ANTARCTICA

Part I of the report seeks to determine which environmental laws apply in Antarctica. Before reviewing that analysis, it should be emphasized that the final determination regarding which environmental measures should be followed at U.S. Antarctic research bases must be made by the Antarctic Policy Group (APG). With the issuance of OMB Circular A-51 and subsequent interagency memoranda, the APG has been charged with formulating policy for the totality of U.S. activities in Antarctica.

Robert M. Andersen
August 25, 1989
Page 2

Clearly, one important aspect of U.S. policy in Antarctica centers on the question whether, and to what extent, U.S. actions in Antarctica must avoid harm to the environment by complying with domestic environmental regulations administered by various federal agencies. Those agencies include the Environmental Protection Agency (EPA), Council on Environmental Quality (CEQ), Marine Mammal Commission (MMC), National Oceanic and Atmospheric Administration (NOAA), U.S. Coast Guard (USCG), and U.S. Fish and Wildlife Service (FWS). In finalizing its report, OGC must defer to the views of these APG member agencies as well as the State Department. This is particularly important in light of the report's erroneous conclusions regarding the application of U.S. laws to Antarctica under common law principles and pursuant to Executive Order 12088.

Extraterritorial Application of U.S. Environmental Laws

The report undertakes a rather superficial legal analysis regarding extraterritorial application of U.S. environmental laws in Antarctica. Essentially, it concludes that unless Congress clearly indicated that particular laws apply to Antarctica, they do not apply. The report then pursues a limited analysis of particular statutes to determine whether they were intended to apply to Antarctica or outside the United States. In support of that approach, OGC cites Foley Brothers, Inc. v. Filardo, 336 U.S. 281 (1949). To be sure, the Supreme Court did declare there that "legislation of Congress, unless a contrary intent appears, is meant to apply only within the territorial jurisdiction of the United States." However, what the report did not evaluate are earlier Supreme Court decisions and policies that laid the basis for and define the scope of that presumption. Had it done so, OGC would have found that Foley is most probably limited to situations where an act occurs in another nation and Congress has declined to interfere with the sovereignty of that nation to regulate the act.

The Foley presumption is ultimately grounded in American Banana Company v. United Fruit Company, 213 U.S. 347 (1909). There, the Supreme Court held "that the character of an act as lawful or unlawful must be determined wholly by the law of the country where the act is done. . . . For another jurisdiction to treat [the actor] according to its own notions rather than those of the place where he did the act, not only would be unjust but would be an interference with the authority of another sovereign, contrary to the comity of nations, . . ." On the basis of that policy, the court later articulated the extraterritorial application presumption in Blackmer v. United States, 284 U.S. 421, 437 (1931). In doing so, it declared that "so far as

Robert M. Andersen
 August 25, 1989
 Page 3

citizens of the U.S. in foreign countries are concerned," the question of application of a particular law is one of construction, not legislative power. Hence, the Blackmer court was clearly concerned about U.S. activities in foreign nations and whether application of U.S. laws to those activities would contravene the policies set out in American Banana.

In this context, the fallacy of applying the Foley doctrine to U.S. activities in Antarctica immediately becomes clear. Antarctica is not a foreign country and no court has ever held it to be so. Beattie v. United States, 756 F. 2d 91 (1984); Martin v. Commissioner of Internal Revenue, 50 T.C. 59 (1968). The report itself concludes that Antarctica is not a foreign nation and more closely resembles the high seas for jurisdictional purposes. As a result of that status, each nation operating in Antarctica is ultimately responsible for the conduct of its own nationals. Accordingly, because other Antarctic Treaty nations do not maintain jurisdictional authority over U.S. citizens in Antarctica, application of U.S. environmental law to U.S. citizens in Antarctica would neither be unjust to the actor nor would it interfere with the sovereignty of other Antarctic Treaty nations. Therefore, the policies outlined in American Banana are not in any way advanced by extending the Foley presumption to U.S. activities in Antarctica. Our research indicates that the presumption has never been applied to U.S. activities taking place outside of foreign countries.

In lieu of applying the Foley doctrine, OGC should utilize an entirely different approach to determining whether U.S. environmental laws apply to U.S. activities in Antarctica. In United States v. Bowman, 260 U.S. 94 (1922), the Supreme Court held that some offenses "are such that to limit their locus to the strictly territorial jurisdiction would be greatly to curtail the scope and usefulness of the statute In such cases, Congress has not thought it necessary to make specific provisions in the law that the locus shall include the high seas and foreign countries, but allow it to be inferred from the nature of the offense." Although this doctrine has typically been applied to criminal statutes, activities that violate U.S. environmental laws (virtually all of which contain criminal sanctions) and result in pollution of Antarctica (where the U.S. has significant interests) arguably fall within the scope of the Bowman doctrine. Indeed, as OGC points out in its report, U.S. environmental laws are among the most "comprehensive and stringent" in the world, and Antarctica is perhaps the most pristine environment on the globe. It is reasonable to infer that Congress would apply U.S. environmental laws to Antarctica since not doing so would severely undercut their objectives.

Robert M. Andersen
August 25, 1989
Page 4

Alternatively, OGC should consider important distinctions that arise out of the Foley doctrine. In Vermilva-Brown Company v. Connell, 333 U.S. 377 (1948) -- a case explicitly distinguished in Foley -- the Court applied the Fair Labor Standards Act to a military base in Bermuda since the Act's definition of "state" included the term "possession." Although the term is typically used to refer to U.S. dependencies, it is not surprising that the Court reached its conclusion since U.S. governance of relations among U.S. citizens on the base did not intrude on Bermuda's sovereignty. On the basis of Vermilva-Brown, U.S. research bases in Antarctica also would appear to be "possessions" of the United States. Our preliminary analysis of the statutory term "state" in various environmental statutes indicates that at least three statutes contain the term "possession." These are the Comprehensive Environmental Response, Compensation and Liability Act (Superfund), Emergency Planning and Community Right to Know Act (EPCRA), and Toxic Substances Control Act (TSCA). Although these statutes were not extensively discussed in NSF's draft report, Appendix I concludes that Superfund and TSCA do not apply in Antarctica and EPCRA was apparently never evaluated. In light of the Vermilva-Brown case, the report should reconsider the applicability of these laws and evaluate other statutory definitions of the term "state" to determine whether they too include "possessions."

Applicability of E.O. 12088 to the U.S. Antarctic Program

While the report broadly extends the Foley presumption to Antarctica, it adopts a very limited interpretation of Executive Order 12088. That order directs each federal facility to comply with pollution control standards that apply to private persons. It also contains a general provision requiring such facilities to observe standards of general applicability in the host country or jurisdiction. The draft report, unfortunately, concludes that the latter provision essentially exempts U.S. research bases from the former's requirements. In reaching that conclusion, the report speculates about ways that the President could have extended environmental laws to federal facilities abroad. On the other hand, what it fails to do is evaluate E.O. 12088 in light of the Order it revoked -- E.O. 11752. That order was signed by President Nixon on December 17, 1973, 38 Fed. Reg. 34793, and also extended U.S. pollution control standards to federal facilities.

Specifically, Section 3(a) of E.O. 11752 provided that the "heads of federal agencies shall, with regard to all facilities under their jurisdiction in the U.S. ensure that applicable

Robert M. Andersen
August 25, 1989
Page 5

standards specified in Section 4 of the Order [domestic environmental standards] are met on a continuing basis." On the other hand, Section 3(c) of the Order only required facilities operating abroad to observe standards of the host jurisdiction. Hence, in 1973, the President did draw a clear distinction between federal facilities operating in the U.S. and abroad. However, Section 1-1 of E.O. 12088 reflects a conscious decision by the President to extend domestic standards to facilities operating abroad since he specifically deleted E.O. 11752's restrictive reference to facilities operating in the U.S. That section makes the head of each agency responsible for ensuring compliance with pollution control standards "with respect to facilities and activities under the control of the agency." If President Carter had wished to maintain the earlier distinction, it would have been simple enough to retain the language of the 1973 Order.

In concluding that E.O. 12088 does not apply to Antarctica, the draft report fails to evaluate the policy behind Section 1-801. That provision appears to be designed to ensure that federal facilities operating abroad do not cause international discord by violating pollution control requirements of the host country. Hence, the Order calls upon each agency to observe, at a minimum, these "host standards." Nothing in the Executive Order indicates that these are the only requirements applicable to federal facilities abroad, however. Indeed, if anything, the stringent exemption procedures contained within Section 1-7 imply that the Order is intended to apply broadly to all facilities. Such an interpretation is reasonable in light of President Carter's statement on signing the Order. He declared that "from now on, all federal facilities must comply with the same standards . . . that apply to individual citizens and private corporations." (emphasis added). If anywhere, that policy certainly should be followed in Antarctica.

Notwithstanding OGC's conclusions regarding the applicability of Section 1-1 to the U.S. Antarctic program, NSF must comply at a minimum with Section 1-801 of E.O. 12088. On page 22 of the draft report, NSF opined that the generally applicable pollution control standards of the Antarctic region include the Code of Conduct on Waste Disposal. In an earlier section of the report, NSF correctly concludes that it should treat the Code as the "mandatory baseline procedure" for handling waste in the Antarctic. To that end, the report reviews recently proposed revisions to the Code made by the Scientific Committee on Antarctic Research (SCAR). While NSF indicated that it generally supports the SCAR recommendations, it apparently suggested that the U.S. seek a clarification of clause 4 of the

Robert M. Andersen
August 25, 1989
Page 6

proposed Code. That clause states that "in the development of their waste management plans, National Antarctic Operators should, where appropriate, take into account their national environmental standards. Where national environmental standards are higher than those recommended in this Code of Conduct, those national standards should apply."

Unfortunately, it is somewhat difficult for EDF to evaluate NSF's position with respect to clause 4 since NSF officials are apparently unwilling to provide EDF with a copy of its proposed clarification. Nevertheless, from footnote 18 of the report, it appears that NSF opposes the imposition of national environmental standards on U.S. Antarctic activities through the Code of Conduct. Referring to the clause as "imprudent and ill-advised," the report claims that it is often difficult to determine a "national standard" and that the mandatory imposition of such standards might do more harm than good to the Antarctic environment. EDF strongly urges the Foundation to reconsider that position, particularly since NSF's reasons for opposing clause 4 are untenable. Indeed, it is difficult to believe that more stringent environmental standards in Antarctica will do more harm than good (and the report does not cite any good examples) or that it would be difficult to identify appropriate national environmental standards. NSF's legal review and EDF's August 1988 report entitled "On Thin Ice" do just that.

II. ASSESSING COMPLIANCE WITH ENVIRONMENTAL LAWS IN ANTARCTICA

Part II of the report evaluates NSF's compliance with what OGC concludes are applicable environmental laws in Antarctica. Throughout this analysis, the report confirms many of EDF's concerns raised in "On Thin Ice." These include NSF's failure to: (1) issue mandatory pollution control regulations required more than a decade ago by the Antarctic Conservation Act; (2) prepare environmental impact assessment guidelines and environmental statements pursuant to E.O. 12114 and the National Environmental Policy Act; (3) implement mitigating measures identified in its 1980 programmatic impact statement; (4) at least macerate wastewater discharges as required by the 1975 Code of Conduct on Waste Disposal; (5) discontinue use of a landfill at McMurdo Station as required by the 1975 Code of Conduct; (6) ensure that oil pollution does not result from leaking storage tanks on the continent or stranded vessels at sea; (7) control emissions from open pit burns, power generators or vehicles used at research stations; (8) comply fully with applicable reporting and monitoring requirements under E.O. 12088; (9) extend comprehensive protection to Antarctic wildlife under the Antarctic Conservation Act; and (10) generally comply with sound

Robert M. Andersen
August 25, 1989
Page 7

U.S. environmental policy embodied in various environmental laws such as the Clean Water Act, Clean Air Act, and Resource Conservation and Recovery Act (RCRA). The comments that follow focus on NSF's intentions to address these problems.

Pollution Control Under the Antarctic Conservation Act

The draft report correctly concludes that NSF has a non-discretionary duty to issue pollution control regulations pursuant to the Antarctic Conservation Act. To that end, it urges the Director to initiate development of these rules so that final regulations are published by the end of 1990. To enhance formulation of those regulations, the report suggests that a special advisory group review the regulations after a draft has been cleared internally. While EDF has no difficulty with formation of this group as long as representatives from the environmental community (including EDF) serve on it, we believe that these regulations should be promulgated more expeditiously. In August 1988, EDF urged the Foundation to issue these regulations by February 1990. Inasmuch as NSF is already a decade overdue, we continue to believe that these regulations must be issued by then. When they are issued, they should establish an Antarctic pollution control program that incorporates the most stringent of U.S. national environmental standards. Indeed, notwithstanding the discussion above regarding the applicability of U.S. environmental laws to Antarctica, the Foundation's pollution control regulations should go farther than many of those laws in protecting the Antarctic environment.

The National Environmental Policy Act and E.O. 12114

In its discussion of environmental impact assessment requirements in Antarctica, NSF erroneously concluded that NEPA, its attendant regulations, and procedural guidelines set forth by CEQ do not apply to Antarctica. Indeed, without any substantive discussion at all, the report simply refers to the existence of a debate and the subsequent issuance of E.O. 12114. In concluding that E.O. 12114 is all that is required, NSF essentially rejects the consistent view of the CEQ that NEPA and CEQ regulations apply to U.S. activities no matter where they may be located. That conclusion is particularly troubling since the objections of the State and Defense Departments to extraterritorial application of NEPA are not relevant to U.S. activities in Antarctica. Those agencies are concerned that application of NEPA abroad will undermine national security interests and allow foreign nationals to comment on U.S. government operations. Yet, NSF's operations in the Antarctic do not raise national security issues and the recently adopted Antarctic Treaty impact assessment procedures

Robert M. Andersen
August 25, 1989
Page 8

encourage participation by other parties. In fact, it is particularly ironic that OGC concludes that NEPA does not apply since it was the U.S. that successfully pressed other Antarctic Treaty parties to adopt impact assessment procedures quite similar to NEPA at the 1987 Treaty meeting.

In any event, the report concludes that E.O. 12114 requires NSF to issue guidelines governing the preparation of environmental impact assessments and statements. As with its pollution control regulations, NSF indicated that those guidelines would be issued more than a decade ago but they have never appeared. In the absence of these guidelines, the report states that NSF has failed to assess major site specific actions over the past decade. However, it only recommends that NSF issue these regulations pursuant to E.O. 12114 "as soon as practicable." As EDF recommended more than a year ago, NSF must issue these guidelines immediately and certainly before the start of the 1989 research season. At the same time, the report should recognize that the absence of these guidelines does not relieve NSF from its obligation to evaluate all actions in Antarctica. Nor does it reduce the standard for such assessments. Hence, while OGC congratulates NSF for preparing an "assessment" for the McMurdo science facility, that document (as we pointed out in an earlier letter) is seriously flawed and should not serve as a basis for future assessments or the guidelines. Rather, the guidelines should be consistent with CEQ's guidance for NEPA and be at least as stringent as NSF's existing NEPA implementing regulations.

Finally, the report urges NSF to complete its revision of the 1980 programmatic environmental impact statement (EIS) "as soon as possible." That just is not good enough. We believe that NSF must commit to having a draft EIS completed within the next 6 months. It has been almost 18 months since NSF solicited comments from the public on issues to be addressed in a new statement. Since then, NSF does not appear to have made any progress whatsoever toward developing a new EIS. The agency has not held scoping hearings, nor has it involved interested members of the public in any further discussions about the scope or nature of this document. This is in the face of a number of comments, both from governmental and non-governmental entities, that a new EIS is absolutely necessary. The Foundation's dilatory approach to this task is particularly problematic since the U.S. Antarctic Program has undergone a number of significant changes since 1980 when the last EIS was released. The Foundation has not prepared supplemental EIS's to evaluate those specific changes. Nor has it implemented most of the mitigating measures identified in the 1980 EIS. Accordingly, continued

Robert M. Andersen
 August 25, 1989
 Page 9

operation of the program under these conditions remains legally questionable.

Wastewater Treatment Requirements

The report correctly concludes that the Code of Conduct requires NSF to macerate wastes before they are discharged from U.S. coastal stations. However, in reporting that the new Code of Conduct requires at least primary treatment of wastewater discharges, OGC erroneously equates "maceration and dilution with brine" with "primary treatment." In the United States, primary treatment generally entails physically removing debris by screening or settling, and typically results in 60% removal of total suspended solids (TSS) and 30% removal of biological oxygen demand (BOD) (135 mg/L). Nowhere in the U.S. is dilution or maceration considered primary treatment since these measures do not remove BOD or TSS. Indeed, although maceration of wastes and a submerged outfall will improve dispersion and dilution, these steps do not adequately improve wastewater quality. Accordingly, the report should commit NSF to implementing measures that at least result in primary treatment of wastewater discharges before they leave the pipe.

Moreover, the report does not seriously consider SCAR's recommendation that research bases with more than 30 people achieve secondary treatment levels by, perhaps, utilizing rotating biological contactors (RBC's). The Foundation's unwillingness to address this issue is apparently based on the report of the Cold Regions Research and Engineering Laboratory (CRREL), which predicted that the BOD of wastewater generated by McMurdo Station is approximately 157 mg/L. However, the recent results from NSF's own waste water monitoring analysis indicate that BOD levels from McMurdo Station are actually 545-1680 mg/L -- 4 to 10 times greater than the CRREL report's estimate. That figure itself may be an underestimate since these measurements were not taken during November and December -- the peak period of activity at McMurdo. In any event, we believe that the high values from January and February readings are much greater than typical domestic sewage, and establish a compelling basis for implementing secondary treatment of discharges at McMurdo Station. Although CRREL goes on to identify several communities that have received waivers from secondary treatment levels under Section 301(h) of the Clean Water Act, that program is not applicable to McMurdo since it is principally designed for municipalities discharging effluents several miles offshore in deep marine canyons.

Robert M. Andersen
August 25, 1989
Page 10

Safe Drinking Water Act

The report concludes that the Safe Drinking Water Act does not apply to Antarctica but that NSF will nonetheless observe its standards. To that end, NSF conducted a water quality test at McMurdo and South Pole stations earlier this year and plans to undertake similar monitoring at Palmer Station next year. While EDF supports these actions, we note that there were certain problems with NSF's water testing program this year. These problems raise questions about whether potable water at McMurdo and South Pole stations is within the national standards established under the Act. Indeed, the methods used to obtain water samples were not in compliance with EPA regulations governing flushing of the system. Beyond those regulations, the methodology was simply inadequate. For example, samples of volatile chemicals were collected with "head space" left in the sample vessels, and vinyl chloride and glycol samples were not run for more than 4 months. In addition, the methodology did not assess EPA's proposed standards for chemicals and was not sufficiently sensitive to determine whether certain chemicals complied with existing standards. This is important since, at least for lead, EPA has proposed to reduce the standard in drinking water by ten-fold. 53 Fed. Reg. 31516, August 18, 1988. Finally, NSF's conclusion that there is no problem with laboratory chemicals is dubious since those chemicals are principally used in November and December.

Solid and Hazardous Waste Management

In its discussion of measures to manage solid and hazardous wastes, OGC accurately notes that neither the existing or proposed Code of Conduct contemplate landfills at coastal stations in Antarctica. Nevertheless, "because of the size and importance of the McMurdo operation to U.S. Antarctic science," the report concludes that "it is currently infeasible to comply with the implicit ban on landfilling activities." Accordingly, OGC recommends continued operation of the Fortress Rock landfill operation by bringing it into compliance with solid and hazardous waste handling criteria established under RCRA. While EDF generally supports application of RCRA's requirements to Antarctica, we can not endorse NSF's plans to continue operation of a landfill at McMurdo Station. Indeed, the McMurdo landfill violates the Code of Conduct, which OGC earlier indicated were "mandatory baseline procedures." Inasmuch as the report also concluded that the Code's provisions are applicable pollution control standards under Section 1-801 of E.O. 12088, NSF must comply with Sections 1-6 and 1-7 of the Order to continue operation of the landfill.

Robert M. Andersen
August 25, 1989
Page 11

The report also echoes EDF's concerns that the area surrounding the Old Winters Quarters Bay dump site is heavily polluted with petroleum waste products, heavy metals, PCB's, and scrap metal. The Foundation indicated in its environmental initiative that this site would be covered over with fill, and (apparently without any environmental analysis) the area was "stabilized and relandscaped" this past season. However, in recognition of the quantities of hazardous wastes potentially buried at the site and the inability of the substrate to contain such wastes, OGC recommends thorough testing and analysis of the substrate by environmental engineers. Such measures, the report suggests, should be undertaken before a final decision is made to cap the site permanently or complete the landscaping. EDF generally supports this approach. Indeed, we are pleased that the report did not adopt the foolhardy advice of OGC's consultant and call for a final cover to the site so as to avoid the requirements of 40 C.F.R. Part 258. Those regulations are scheduled to become final by the end of this year, 53 Fed. Reg. 42537), and should be observed by NSF. At the same time, OGC's report should recognize that CERCLA's provisions might also apply to this site.

Prevention of Oil Pollution in Antarctica

This past year witnessed major oil spills at both U.S. coastal research bases in Antarctica. First, in September 1988, a fuel bladder leaked at McMurdo resulting in the release of more than 13,000 gallons of fuel near Williams Field. Subsequently, in January 1989, the Bahia Paraiso spilled 250,000 gallons of diesel fuel near Palmer Station. The report calls for a "comprehensive program to minimize the risk of accidental spills or discharge of fuel on land or at sea." While EDF certainly supports that objective, we believe that OGC should be more specific about precisely what measures NSF should adopt. For example, the reports cites the utility of berms around storage tanks but it fails to recommend that they be established. In this context, not only should berms be established but OGC should recommend that the U.S. Antarctic program comply with 40 C.F.R. Sec. 112. That section requires Spill Prevention Control and Countermeasures (SPCC) for particular facilities. To that end, it requires facilities to set out practices devoted to spill prevention, including secondary containment, and removal and disposal options. In addition, the report should make it clear that the Act to Prevent Pollution from Ships and other domestic oil pollution control measures apply to U.S. Coast Guard and Navy vessels operating in the Antarctic.

Robert M. Andersen
August 25, 1989
Page 12

Cleanup of Abandoned Stations

As the report correctly points out, the proposed Code calls for cleanup of abandoned work sites. For the U.S., such sites include Marble Point Camp, Cape Hallet Station, Old Palmer Station, Siple Base, Byrd Station, Plateau Station, Eighties Station, and East Base. EDF supports the report's recommendation that NSF follow CERCLA and its implementing regulations in conducting removal and remedial actions. However, we are somewhat concerned about NSF's commitment to this proposed Code provision in light of the report's rather noncommittal language. For example, it declares that NSF "should endeavor to comply with this directive within the limits of its logistical, financial, and human resources." Elsewhere, the report implies that such cleanup operations should not be initiated before environmental impacts associated with decontamination and site-rehabilitation are evaluated. EDF urges OGC to eliminate this qualifying language in the final report so that it reflects a firm commitment to cleanup these work sites. This is particularly important in light of the discarded batteries, hazardous wastes, and leaking fuel bladders at these abandoned bases.

Air Emissions

The report accurately states that there are no emission controls and little, if any, air monitoring, at U.S. research stations in Antarctica. It then goes on to evaluate the proposed Code and applicable laws, and concludes that the current practice of open pit burning should be discontinued. EDF supports the report's conclusion that NSF expedite its search for an effective incinerator at McMurdo Station. However, we note that, to the greatest extent practicable, NSF should initially seek to retrograde all wastes out of Antarctica rather than incinerating them there. This is particularly true for Palmer Station, where incineration should not be pursued given that station's proximity to wildlife breeding sites. Moreover, if NSF establishes an incinerator at McMurdo, it must retrograde all combustion ash out of the Treaty area. The report's conclusion that "landfilling ash is a lawful and reasonable alternative" ignores the Code's ban on landfills and is made in the absence of any information concerning the toxicity of the combustion ash. Incineration tends to concentrate toxic contaminants since these compounds are not destroyed during the burn and often are chemically altered to produce even more toxic substances. Accordingly, combustion ash must be managed as a hazardous waste in Antarctica.

With respect to emissions from generators, the report suggests that compliance with standards established under the

Robert M. Andersen
August 25, 1989
Page 13

Clean Air Act would not be that useful since some state implementation plans permit burning of emissions without controls. Even assuming that to be true, OGC does not recognize that the Act seeks to prevent significant deterioration of pristine air quality near "international parks" and national wilderness areas (so-called class I areas). We find it difficult to believe that OGC could conclude that the environment surrounding U.S. research bases in Antarctica does not constitute such areas. Hence, the report should go farther than simply calling for NSF consideration of a contract of a study. It should unequivocally recommend such a study and adoption of appropriate controls. Similarly, the report should suggest more than just a "preference" for cleaner fuels as vehicles and heavy equipment are replaced. It should unequivocally recommend the use of unleaded gasoline by all vehicles at U.S. research bases in Antarctica.

Environmental Monitoring and Reporting Requirements

EDF supports OGC's conclusions regarding the important need for environmental monitoring and reporting. To that end, the report calls for the "design of a program to insure compliance" with these obligations. In this context, the report should emphasize that compliance with Section 1-801 of E.O. 12088 does not relieve NSF from observing the Order's procedural provisions, nor does it strip EPA of authority to enforce that Order. Accordingly, the report should unequivocally commit to implementing Section 1-2 (requires cooperation and consultation between NSF and EPA concerning the best techniques available for control of environmental pollution); Section 1-4 (requires annual submission by NSF of a plan to the Office of Management and Budget through the EPA that provides for the control of environmental pollution); and Section 1-5 (requires NSF to ensure that sufficient funds for compliance with pollution control standards are requested in the agency's budget). Moreover, NSF's report should acknowledge the special role that the EPA plays in implementing E.O. 12088. Under Sections 1-3 and 1-6, EPA may conduct reviews and inspections of U.S. Antarctic research bases, and require NSF to submit a plan for achieving compliance with pollution control standards. To facilitate that effort, OGC should recommend that EPA utilize the "Antarctic Environmental Audit Protocol" developed by EDF during the 1989 research season.

Wildlife Conservation under the Antarctic Conservation Act

Generally, EDF is disappointed with OGC's conclusions regarding NSF's compliance with the conservation provisions of the Antarctic Conservation Act. The report opined that NSF's

Robert M. Andersen
 August 25, 1989
 Page 14

issuance of regulations at 45 C.F.R. Part 670 "fully implemented its conservation rulemaking responsibilities" under the Act. As EDF indicated in "On Thin Ice" and subsequent letters to the Foundation on this subject, NSF has fallen short of implementing the statute in a number of important ways. For example, the report concluded that all native species of mammals and birds have been designated as "native species" under the Act. In reaching that conclusion, it declares that these designations "fully conform to the definitions of indigenous mammals, birds, and plants contained in Article II of the Agreed Measures." Notwithstanding OGC's narrow interpretation of the term "indigenous," those definitions indicate that a species need not be indigenous to Antarctica to be a native species there. Indeed, as the Act makes clear, it need only "occur there through natural agencies of dispersal" to be considered native. In August 1988, EDF identified a number of species reportedly observed within Antarctica. The report should recommend that these species be designated as "native species" immediately.

Moreover, OGC should recognize NSF's affirmative conservation responsibilities under Section 12 of the Act. That section provides that "each federal department or agency whose activities affect Antarctica shall utilize, to the maximum extent practicable, its authorities in furtherance of the purposes of the Act" 16 U.S.C. Sec. 2411. Those purposes are "to provide for the conservation and protection of the fauna and flora of Antarctica, and of the ecosystem upon which such flora and fauna depend" 16 U.S.C. Sec. 2401. To that end, EDF urged NSF in August 1988 to sponsor a systematic evaluation of significant areas within Antarctica that warrant protection as "Specially Protected Areas" (SPA's). In rejecting that suggestion, OGC declares that those seeking designation of additional SPA's must direct their requests, through the State Department, to the Antarctic Treaty parties. To be sure, those parties are ultimately responsible for designation of SPA's. However, those procedures do not relieve NSF of the obligation to further Antarctic conservation efforts by supporting studies of possible SPA's. This is particularly true in light of a 1987 SCAR recommendation that "consultative parties suggest to their governments that measures be taken to encourage the submission of proposals for additional protected areas." In the United States, the Polar Research Board apparently believes that NSF should take the lead in this effort.

In addition, the report must recognize that NSF has not strictly governed entry into protected areas or taking of native species designated under the Act. Indeed, the Foundation has generally adopted an unusually broad interpretation of the Act's

Robert M. Andersen
August 25, 1989
Page 15

provisions governing such activities. For example, in November 1988, the Foundation issued permits to members of the news media to enter SPA's. Such permits can only be issued where "there is a compelling scientific purpose for such entry which cannot be served elsewhere." Similarly, NSF authorized such individuals to take "native species" even though such taking may only be authorized to provide specimens for scientific study or scientific information or for museums, zoological gardens, or other educational or cultural institutions or uses. November 23, 1988, 53 Fed. Reg. 47593. We note that NSF currently has before it yet another permit application that raises the same issues. July 31, 1989, 54 Fed. Reg. 31595. The report should recommend a much stricter interpretation of these criteria so that NSF's permitting actions do not defeat the protection afforded Antarctic wildlife under the Act and the Agreed Measures.

Finally, the report is incorrect in concluding that NSF has fulfilled its nondiscretionary rulemaking responsibilities under Section 6 of the Antarctic Conservation Act (with the exception of pollution control regulations). Subsection 2(b) of that section requires NSF to "specify those actions which must, and those actions which must not, be taken within Antarctica in order to protect, in accordance with the applicable provisions of the Agreed Measures, each native species designated under [the Act]." 16 U.S.C. Sec. 2405(b)(2) (emphasis added). Although Article VII of the Agreed Measures contains a number of provisions designed to reduce harmful interference with Antarctic wildlife, these have never been extended to U.S. citizens through NSF's promulgation of regulations. Specifically, this section seeks to minimize harmful interference with the normal living conditions of any native mammal or bird. Harmful interference includes: allowing dogs to run free; flying aircraft, driving vehicles, and discharging firearms near bird and seal colonies; or disturbing bird and seal populations during the breeding season by persistent attention from persons on foot. Although OGC concludes that its regulatory definition of "take" is sufficiently broad to prohibit "harmful interference," the report should recommend immediate issuance of regulations implementing these provisions of the Agreed Measures. Such action would ensure that U.S. tourists comply with the Agreed Measures and U.S. Coast Guard aircraft do not disrupt Antarctic wildlife colonies.

That completes the comments of the Environmental Defense Fund on OGC's draft report. We appreciate the opportunity to review the draft report and we hope that NSF will continue to involve the public in its decisions about appropriate environmental policy in Antarctica. In this context, we note

Robert M. Andersen
August 25, 1989
Page 16

that NSF has established a Task Force to integrate the recommendations of OGC's report with the NSF's environmental agenda. That task force should seriously involve representatives from the environmental community interested in this issue. Moreover, any determinations that the Task Force makes should be noticed in the Federal Register and not finalized until the public has had an opportunity to submit comments. Thank you for your consideration of these comments.

Respectfully submitted,

Bruce S. Manheim, Jr.

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ENVIRONMENTAL DEFENSE FUND

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May 7, 1990

Mr. Erich Bloch
Director
National Science Foundation
1800 G Street, N.W.
Washington, D.C. 20550

Dear Mr. Bloch:

Enclosed please find a petition requesting the National Science Foundation to promulgate expeditiously regulations that prohibit U.S. citizens from engaging in activities that result in "harmful interference" with Antarctic wildlife. This petition is submitted to the National Science Foundation pursuant to the Administrative Procedures Act, 5 U.S.C. §553(e), and the Antarctic Conservation Act, 16 U.S.C. §2401 et seq..

As set out in detail in the enclosed petition, Section 6 of the Antarctic Conservation Act imposes a mandatory duty on the Director of the National Science Foundation to issue regulations that implement the "harmful interference" provisions of the 1964 Agreed Measures for the Conservation of Antarctic Fauna and Flora. Moreover, even if the Foundation concludes that no such duty exists, it is clear that the dramatic rise in U.S. tourist activities in Antarctica over the recent past and the prospect for increased activities warrant the exercise of your discretionary regulatory authority under Section 10 of the Act.

Accordingly, the Environmental Defense Fund (EDF) urges the Foundation to promulgate these regulations no later than November 1, 1990. Because EDF believes these regulations to be critical to effective protection of Antarctic wildlife, I respectfully request the Foundation to advise me of its intentions with respect to the actions requested in the enclosed petition within 30 days.

Respectfully submitted,

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Enclosure

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PETITION TO THE NATIONAL SCIENCE FOUNDATION REQUESTING PROMULGATION OF "HARMFUL INTERFERENCE" REGULATIONS GOVERNING U.S. CITIZENS IN ANTARCTICA

Pursuant to the Administrative Procedures Act, 5 U.S.C. §553(e), and the Antarctic Conservation Act, 16 U.S.C. §§2401 et seq., the Environmental Defense Fund ("EDF") hereby petitions the National Science Foundation ("NSF") to promulgate regulations that prohibit U.S. citizens from engaging in activities that result in "harmful interference" with Antarctic wildlife. These regulations are necessary to address a rapidly expanding U.S. tourist industry in Antarctica. Repetitive and concentrated visits sponsored by U.S. tour operators to Antarctic wildlife sites occur at the same time that seals, penguins and other seabirds breed. As a result, they place additional stress on Antarctic wildlife and could cause animals to abandon their breeding sites or increase the vulnerability of their eggs and young to predation. Regulations to address these threats must be promulgated by November 1, 1990 to govern what will almost certainly be the greatest number of U.S. tourists ever to visit Antarctica beginning in December 1990. The bases for this petition are set out below in detail.

1. SECTION 6(B) OF THE ANTARCTIC CONSERVATION ACT IMPOSES A MANDATORY DUTY ON THE DIRECTOR OF THE NATIONAL SCIENCE FOUNDATION TO ISSUE SPECIFIC REGULATIONS PROHIBITING U.S. CITIZENS FROM HARMFULLY INTERFERING WITH ANTARCTIC WILDLIFE.

To protect native wildlife from increased human activities in Antarctica, the parties to the Antarctic Treaty adopted the Agreed Measures for the Conservation of Antarctic Fauna and Flora (hereafter "Agreed Measures") in 1964. Under Article VII of that agreement, the United States is required to "take appropriate measures to minimize harmful interference [by U.S. citizens] within the [Antarctic] Treaty Area with the normal living conditions of any native mammal or bird." Activities resulting in "harmful interference" include "allowing dogs to run free; flying helicopters or other aircraft in a manner which would unnecessarily disturb bird and seal concentrations, or landing close to such concentrations; driving vehicles unnecessarily close to concentrations of birds and seals; use of explosives [or discharge of firearms] close to bird and seal concentrations; or any disturbance of bird and seal colonies during the breeding period by persistent attention from persons on foot." In addition, Article XI calls on the U.S. to arrange, "as far as feasible," that the crew members of foreign flag vessels utilized for U.S. expeditions to Antarctica also observe these provisions.

To implement the Agreed Measures and other Antarctic Treaty recommendations in the United States, Congress enacted the Antarctic Conservation Act on October 28, 1978. The fundamental purpose of the Act is to "provide for the conservation and protection of the fauna and flora of Antarctica, and of the ecosystems upon which such fauna and flora depend, consistent with the Agreed Measures . . ." 16 U.S.C. §2401(b). To that end, Section 6(b) of the Act requires the Director of the National Science

Foundation to prescribe regulations which, among other things, "specify those actions which must, and those actions which must not, be taken within Antarctica in order to protect, in accordance with applicable provisions of the Agreed Measures, members of each native species" of bird, mammal and plant. 16 U.S.C. §2405(b)(2). Most recently, in a report entitled "A National Science Foundation Strategy for Compliance with Environmental Law in Antarctica," NSF's Deputy General Counsel indicated that Section 6(b) of the Act imposes a "mandatory duty" on the Director to promulgate regulations. However, he also concluded that NSF "is in compliance with its conservation obligations under the [Act]" and "existing regulations implement a responsible and comprehensive program . . . in accordance with the Agreed Measures."

To date, NSF's implementing regulations for the Act govern the taking and importation of native mammals and birds, collection of native plants within certain protected areas, entry into internationally designated areas, and introduction of non-indigenous species into Antarctica. 45 C.F.R. Part 670. While these rules apply several of the Agreed Measures' provisions to U.S. citizens, they do not implement the aforementioned harmful interference provisions of the Agreed Measures. For example, NSF's regulations prohibiting the taking of native mammals and birds do not necessarily limit "persistent attention" from U.S. citizens at wildlife breeding sites, which may constitute harmful interference under the Agreed Measures. Moreover, the existing regulations do not fulfill the broader mandate of Section 6(b)(2) to specify actions (which may go beyond the Agreed Measures' provisions) that must be taken in order to protect members of each native species in Antarctica. The existing regulations, for example, do not extend protection to native plant species (e.g., lichens and mosses) that may be trampled by tourists nor do they ensure that ship crew utilized for U.S. expeditions observe the Agreed Measures.

Nevertheless, NSF does not apparently plan to issue regulations that at least prohibit U.S. citizens from engaging in activities specifically identified under the Agreed Measures as constituting "harmful interference" with Antarctic wildlife. See, Semiannual Regulatory Agenda, 55 Fed. Reg. 16956, April 23, 1990. That conclusion is troubling since regulatory action by NSF pursuant to the Section 6(b)(2) could substantially address impacts from tourism in Antarctica. Under the Act, the term "U.S. citizen" is broadly defined to mean "any individual who is a citizen or national of the United States; [and] any corporation organized under the laws of any of the United States." See, 16 U.S.C. §2402(16)(A-B). Hence, not only does the Act apply to U.S. citizens visiting Antarctica but it also extends to Antarctic tour companies that are incorporated in the U.S.. Those companies include Abercrombie & Kent, Conder Expeditions, International Expeditions, Mountain Travel, Ocean Cruise Lines, Society Expeditions, Travcoa, Salen Lindblad Cruising, and Travel Dynamics. Inasmuch as these companies are the principal Antarctic tour operators, unilateral action by the U.S. under the Act could reduce harassment of Antarctic wildlife and increase protection of particularly vulnerable sites in Antarctica.

Such action is particularly warranted since, over the recent past, several of these companies (and other U.S. based organizations) have sponsored expeditions to Antarctica that have resulted in "harmful interference" with Antarctic wildlife. For example, one company has annually sponsored

helicopter flights to Ardley Island that reportedly scatter penguins in terror on each landing. At the same time, certain U.S. seaborne operators often operate zodiacs near concentrations of birds and seals, and frequently off-load tourists at sensitive wildlife sites during the breeding season. The frequency of landings and number of tourists visiting such areas has increased dramatically over the past five years. During the 1988-89 season, a number of sites were repeatedly visited, including Port Lockroy (2459, 24 visits), Nelson Island (2110, 22 visits), Cuverville Island (1920, 19 visits), Torgerson Island (1421, 13 visits), Peterman Island (1374, 13 visits), and Half Moon Bay (1218, 12 visits). These repetitive, frequent visits during the breeding season certainly rise to the level of disturbance from "persistent attention" identified in the Agreed Measures as constituting harmful interference. Such visits will even be greater later this year with the operation of additional tour vessels, including a 480 passenger ship, in Antarctica.

Although several U.S. tour companies recently issued guidelines to govern certain tourist activities, these rules do not obviate the need for NSF to issue mandatory regulations that protect native Antarctic wildlife from harmful interference by U.S. citizens. Indeed, the tour operators' guidelines remain incomplete and do not ensure compliance with the Agreed Measures or the Act. For example, while the guidelines suggest that each tour operator communicate its itinerary to other vessels to avoid "over-visitation" of any site, they do not specify precisely how many visits to any one site actually amounts to "over-visitation." Similarly, the guidelines call for "good judgement" on the part of ship crew and zodiac drivers to avoid distressing marine mammals, but they do not establish specific limits on viewing distances or vessel operation near these species. Moreover, it is unclear how and to what extent the guidelines will actually be enforced against passengers and ships' crew. Finally, even assuming the guidelines were complete, several tour operators have not endorsed them. A representative of one tour operator (Ocean Cruise Lines) recently stated that the company would not adhere to the guidelines since "there's nothing that says we have to." He indicated that the company would comply "only with any legal requirements."

On January 28, 1990, EDF submitted a detailed set of recommendations for immediate regulatory action by the Foundation to establish appropriate legal requirements for U.S. tour operators in Antarctica. Those recommendations, contained in our report *Paradise Lost?*, were based on an analysis of the Antarctic Conservation Act and the nature of U.S. tour operations in Antarctica. Although articulated in much more detail in that report, EDF believes that the harmful interference provisions of the Agreed Measures and the Antarctic Conservation Act require NSF to issue regulations that, among other things: prohibit operation of aircraft and vessels, including zodiacs, within certain distances of wildlife sites; establish minimum viewing distances for Antarctic wildlife on land and at sea; mandate U.S. tour operators to limit the frequency, size and duration of visits to wildlife sites; require operators to utilize an appropriate number of certified staff to supervise such visits, including an NSF-designated enforcement officer; and establish a program of coordination, monitoring, and reporting of all U.S. tour operator visits to Antarctica.

II. SECTION 6(A) OF THE ANTARCTIC CONSERVATION ACT IMPOSES A MANDATORY DUTY ON THE DIRECTOR OF THE NATIONAL SCIENCE FOUNDATION TO ISSUE GENERAL REGULATIONS PROHIBITING U.S. CITIZENS FROM HARMFULLY INTERFERING WITH ANTARCTIC WILDLIFE.

Even assuming that NSF has fulfilled its responsibilities with respect to specific rulemaking under Section 6(b) of the Act, it still must issue regulations pursuant to its general rulemaking authority under Section 6(a) of the Act. That Section provides that the "Director, after consultation with the Secretary of State and other appropriate Federal officials, shall prescribe such regulations as are necessary and appropriate to implement the provisions of [the] Act." 16 U.S.C. §2405(b). In construing this "general rule-making section," the Deputy General Counsel concluded that it too "imposes a mandatory duty on the Director to promulgate necessary and appropriate regulations in addition to those already specified in Section 6(b)." The mandatory nature of Section 6(a), however, hinges on a determination by the Director that regulations are "necessary and appropriate" to implement the Act. As with Section 6(b), such regulations may go beyond that required simply to implement the Agreed Measures. See, 16 U.S.C. §2401(b).

In July 1988, NSF held a public hearing to consider the need for specific regulations governing Antarctic tourism. At that hearing, NSF's Deputy General Counsel indicated that the agency was contemplating expanding its current regulations under the Antarctic Conservation Act to include administrative enforcement provisions, information requirements for prospective travelers, NSF jurisdiction over such travelers, and guidelines for tourism in Antarctica. In early 1989, NSF did issue regulations to govern civil enforcement actions against those who have allegedly violated the Act. However, NSF has not articulated regulations that identify specifically those activities that violate the Act. Instead, the Deputy General Counsel has indicated that the Foundation's regulations implementing certain provisions of the Act broadly define the term "take" and those regulations "provide NSF extraordinary latitude for their enforcement." However, even assuming that to be the case, it remains uncertain whether and to what extent the harmful interference provisions of the Agreed Measures can be implemented through the taking prohibitions of the Act.

As set out above, the Agreed Measures define harmful interference as "any disturbance of bird and seal colonies during the breeding period by persistent attention from persons on foot." Yet, it is completely unclear from the Foundation's existing regulations at what point "any disturbance from persistent attention" amounts to a "taking" under the Act. In fact, the level of harmful interference from pedestrian activity proscribed by the Agreed Measures may not reach the threshold of "harm, harassment or molestation" prohibited by the taking provisions of the Act. Moreover, even if it does, it will be very difficult as a practical matter to implement the harmful interference provisions of the Agreed Measures through the Act's taking provisions in the absence of more specific regulations or interpretative guidance from NSF. Indeed, because "taking" is only permitted essentially for scientific purposes, the Act does not provide for prior review of tourist or other non-scientific activities near or within wildlife sites (other than designated protected areas). Hence, while the Deputy General Counsel may assert that NSF has broad latitude in enforcing the taking prohibitions of the

Act. Further regulations are clearly "necessary and appropriate" if NSF plans to enforce the harmful interference provisions of the Agreed Measures through the taking prohibitions of the Act.

These regulations are particularly warranted in light of the dramatic increase in U.S. tourist activities in Antarctica over the recent past. Although the U.S. had previously implemented the Agreed Measures through informal administrative procedures, the State Department proposed implementing legislation because it was thought to be necessary to control the activities of all U.S. citizens in Antarctica. That need, at least in part, stemmed from the increasing number of U.S. tourists visiting Antarctica. During the Congressional hearings that preceded passage of the Act, NSF officials expressed serious concerns about the growth of tourism in Antarctica and the possibility that U.S. citizens could violate the Agreed Measures. At that time, NSF officials were concerned about an increase in tourism from 30 U.S. nationals in 1969 to 240 in 1972 and 360 in 1976. The Foundation's prediction that the number of U.S. tourists in Antarctica could increase to 600 or 700 per year turned out to be a significant underestimate.

Over the past five years, U.S. tourist activities in Antarctica have increased dramatically. For example, between 1983 and 1988, Antarctic tours sponsored by U.S. operators increased by almost 350% from 822 tourists to 2863 visitors. To accommodate that growth, two additional tour operators entered the market and one longstanding company operated additional cruises. The Antarctic tour season, which averaged 55 days in the early 1980's, extended to 95 days over each of the past three years. This growth will almost certainly continue with the imminent introduction of additional tour vessels in Antarctica. For the 1990-91 season, Ocean Cruise Lines plans to utilize a 480 passenger vessel (Ocean Princess), Salen Lindblad Cruising will sponsor trips on a 165 passenger ship (Frontier Spirit), and Abercrombie & Kent plans to charter a 72 passenger vessel (Polar Circle) for a number of expeditions. During the 1991-92 season, Mountain Travel intends to operate a 40 passenger ship (M.V. Nordbrise) for several trips to the Antarctic peninsula region. Finally, Society Expeditions has reportedly commissioned construction of two additional tour vessels for operation in Antarctica in the near future.

III. EVEN IF THE DIRECTOR OF THE NATIONAL SCIENCE FOUNDATION DOES NOT HAVE A MANDATORY DUTY TO PROMULGATE HARMFUL INTERFERENCE REGULATIONS, HE SHOULD ISSUE SUCH REGULATIONS UNDER SECTION 10(F) OF THE ANTARCTIC CONSERVATION ACT.

Under section 10(f) of the Act, the Director "may prescribe such regulations as may be appropriate to enforce the provisions of [the] Act and of any regulation prescribed or permit issued under the Act." 16 U.S.C. §2409(f). Consequently, even if the Foundation does not have a mandatory obligation to issue regulations prohibiting harmful interference with Antarctic wildlife under Section 6 of the Act, it does possess discretionary authority to implement such regulations. From the description above, it is clear that NSF should exercise that discretion and issue regulations to eliminate impacts to Antarctic wildlife from increasing U.S. tourist expeditions to Antarctica. Such action is particularly warranted in light of the failure of many of these companies to comply with existing measures to protect Antarctica. Accordingly, it would clearly be appropriate for NSF to

issue "harmful interference" regulations under Section 10(f). Indeed, such action would permit NSF to follow through on its public contentions that tourism poses a serious threat to the Antarctic environment. See, e.g., World Moving In On Pristine Antarctic, *The Atlanta Constitution*, Dec. 20, 1987; Trouble Way Down Under, *The Washington Post*, May 27, 1988; and Struggling to Protect the Ice, *Los Angeles Times*, April 5, 1990.

ENVIRONMENTAL DEFENSE FUND

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August 7, 1990

Lawrence Rudolph
Assistant General Counsel
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Dear Mr. Rudolph,

This letter provides the comments of the Environmental Defense Fund (EDF) on "Procedures for Implementing Executive Order 12114" published by the National Science Foundation (NSF) in the Federal Register on July 10, 1990. 55 Fed. Reg. 28236. EDF is pleased that the Foundation has finally issued these guidelines, which were due more than a decade ago. However, EDF continues to believe that the National Environmental Policy Act (NEPA), 42 U.S.C. §§ 4321-4347, applies to U.S. activities in Antarctica. Unfortunately, NSF's procedures for implementing E.O. 12114 in Antarctica do not offer the same level of environmental protection or degree of public participation as NSF's procedures implementing NEPA in the United States. Moreover, the proposed guidelines flatly ignore provisions of E.O. 12114 and are inconsistent with NSF's own interpretation of that Executive Order. In addition, the guidelines do not ensure that the United States fulfills its international obligations to prepare and circulate environmental evaluations pursuant to Recommendation XIV-2 adopted by the Antarctic Treaty parties in 1987. EDF's specific comments on these issues are set out below in detail.

I. THE PROPOSED PROCEDURES ARE NOT CONSISTENT WITH THE NATIONAL ENVIRONMENTAL POLICY ACT, WHICH APPLIES TO U.S. ACTIVITIES IN ANTARCTICA.

Although NSF has consistently maintained that the requirements of E.O. 12114 are quite similar to various provisions of NEPA, NSF's proposed guidelines do not come close to extending NEPA-like concepts to the U.S. Antarctic Program (USAP). For example, NEPA requires federal agencies to prepare an environmental impact statement (EIS) upon a finding of "significant impact." To make that determination, both NEPA and Council on Environmental Quality (CEQ) guidelines require federal agencies to prepare a concise public document (i.e., an environmental assessment) that contains "sufficient evidence and analysis"

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Lawrence Rudolph
August 7, 1990
Page 2

of the impacts of a proposed action, discusses the need for the proposed action, and evaluates environmental impacts of alternatives to the action. The finding contained in that document is then noticed in the Federal Register and the document itself is made available for public review. In the event that an EIS is required, the federal agency must then involve the public in preparation of that document and it must prepare site-specific statements even if a programmatic statement has also been done. These requirements are mandatory and do not hinge on resources available to the agency.

In contrast, NSF's proposed procedures require a determination of "significant harm" to the environment before preparation of an impact statement is required. See, Proposed 45 C.F.R. §641.15(d). In making that determination, NSF's proposed procedures call upon a "Responsible Official" to "consider" the impacts of a proposed action and to decide whether the action significantly harms the Antarctic environment. See, Proposed 45 C.F.R. §641.21(c-d). However, no actual analysis or evidence is required beyond the personal opinion of that official (or a panel of officials) regarding potential impacts. Moreover, NSF proposed procedures do not call for consideration of alternatives to the proposed action nor do they require NSF to publish the availability of these documents or even the findings contained within such documents in the Federal Register. See, Proposed 45 C.F.R. §641.24. In addition, assuming NSF concludes that an impact statement is required, its proposed procedures provide that it need only comply with its NEPA implementing procedures to the "extent possible and consistent" with its 12114 procedures. That language is particularly problematic since NSF's proposed 12114 guidelines do not require the agency to prepare site-specific impact statements where a generic or programmatic statement "involving analysis of effects directly relevant" to the effects of the site-specific action has been completed. See, Proposed 45 C.F.R. §641.22(c)(1). Finally, unlike NEPA, NSF's proposed procedures qualify the agency's commitment to carry out assessments by making it dependent upon "available resources." See, Proposed 45 C.F.R. §641.12

The inconsistencies noted above make clear that NSF's guidelines implementing E.O. 12114 are not at all similar to procedures required under NEPA. Indeed, despite NSF's own conclusion that the Order is designed to "further the purposes of NEPA," the proposed procedures severely undercut the statute. See, Proposed 45 C.F.R. §641.10(a). This is quite troubling since NSF's Office of General Counsel (OGC) erroneously concluded in December 1989 that NEPA and many other environmental laws do not apply to U.S. activities in Antarctica. That opinion was based on a rather superficial legal analysis regarding extraterritorial application of U.S. environmental laws in Antarctica. Essentially, NSF concluded that unless Congress clearly indicated that particular laws apply to Antarctica, they do not apply. The report then pursued a limited analysis of particular statutes to determine whether they were intended to apply to Antarctica or outside the United States. In support of that approach, OGC cited Foley Brothers, Inc. v. Filardo, 336 U.S. 281 (1949). To be sure, the Supreme Court did declare

Lawrence Rudolph
August 7, 1990
Page 3

there that "legislation of Congress, unless a contrary intent appears, is meant to apply only within the territorial jurisdiction of the United States." However, what the report did not evaluate are earlier Supreme Court decisions and policies that laid the basis for and define the scope of that presumption. Had it done so, OGC would have found that Foley is limited to situations where an act occurs in another nation and Congress has declined to interfere with the sovereignty of that nation to regulate the act.

The Foley presumption is ultimately grounded in American Banana Company v. United Fruit Company, 213 U.S. 347 (1909). There, the Supreme Court held "that the character of an act as lawful or unlawful must be determined wholly by the law of the country where the act is done. . . . For another jurisdiction to treat [the actor] according to its own notions rather than those of the place where he did the act, not only would be unjust but would be an interference with the authority of another sovereign, contrary to the comity of nations" On the basis of that policy, the court later articulated the extraterritorial application presumption in Blackmer v. United States, 284 U.S. 421, 437 (1931). In doing so, it declared that "so far as citizens of the U.S. in foreign countries are concerned," the question of application of a particular law is one of construction, not legislative power. Hence, the Blackmer court was clearly concerned about U.S. activities in foreign nations and whether application of U.S. laws to those activities would contravene the policies set out in American Banana.

In this context, the fallacy of applying the Foley doctrine to U.S. activities in Antarctica immediately becomes clear. Antarctica is not a foreign country and no court has ever held it to be so. Beattie v. United States, 756 F. 2d 91 (1984); Martin v. Commissioner of Internal Revenue, 50 T.C. 59 (1968). The Foundation itself concludes that Antarctica is not a foreign nation. As a result of that status, each nation operating in Antarctica is ultimately responsible for the conduct of its own nationals. Accordingly, because other Antarctic Treaty nations do not maintain jurisdictional authority over U.S. citizens in Antarctica, application of U.S. environmental law to U.S. citizens in Antarctica would neither be unjust to the actor nor would it interfere with the sovereignty of other Antarctic Treaty nations. Therefore, the policies outlined in American Banana are not in any way advanced by extending the Foley presumption to U.S. activities in Antarctica. Inasmuch as NEPA is not restricted by its own language or legislative history to assessment of impacts in the United States, it also applies to Antarctica.

Nevertheless, in its discussion of environmental impact assessment requirements in Antarctica in the December 1989 report, NSF erroneously concluded that NEPA, its attendant regulations, and procedural guidelines set forth by CEQ do not apply to Antarctica. Indeed, without any substantive discussion at all, the report simply refers to the existence of a debate and the subsequent issuance of E.O. 12114. The conclusion of NSF that E.O. 12114 is all that is required to assess its activities in Antarctica is particularly

...including those the objections of the State and Defense Departments to extrajurisdictional application of NEPA are not relevant to U.S. activities in Antarctica. These agencies were concerned that application of NEPA abroad could undermine national security interests and allow foreign nationals to comment on U.S. government operations. Yet, NSF's operations in the Antarctic do not raise national security issues and the comprehensive evaluation procedures adopted by the Antarctic Treaty parties actually require participation by other parties. As a result, NEPA applies to U.S. activities in Antarctica and NSF's implementing regulations for that statute should be modified accordingly. Moreover, even if it does not apply as a matter of law, the proposed guidelines should be revised to parallel NEPA and CEQ guidelines.

11. EVEN ASSUMING THAT THE NATIONAL ENVIRONMENTAL POLICY ACT DOES NOT APPLY TO U.S. ACTIVITIES IN ANTARCTICA, NSF'S PROPOSED PROCEDURES ARE INCONSISTENT WITH PROVISIONS OF EXECUTIVE ORDER 12114 PERTAINING TO ANTARCTICA.

Unfortunately, despite NSF's recognition of the value of maintaining Antarctica in its near pristine state, the proposed procedures contain several provisions that exempt a wide variety of activities from environmental review. Indeed, in utilizing these exceptions, NSF has simply ignored provisions of E.O. 12114. For example, through proposed §641.21(b)(2), NSF extends a variety of exemptions to the U.S. Antarctic program by invoking Section 2-5(a) of the Order. At the same time, under proposed §641.21(b)(1), NSF seeks to categorically exclude many of its activities by pointing to Section 2-5(c). However, what NSF has overlooked in this process is Section 2-5(d) of the Order, which provides that provisions of Section 2-5 do not apply to actions described in Section 2-3(a) of the Order, unless permitted by law. Those activities are "major federal actions significantly affecting the environment of the global commons outside the jurisdiction of any nation (e.g., the oceans or Antarctica)." As a result, NSF's proposed procedures improperly extend a sweeping set of exemptions to the NSF's activities in Antarctica. Clearly, NSF's final guidelines implementing these procedures must not include the exemptions contained within Section 2-5 of the Order.

Moreover, even assuming that the President did not intend to exclude the exemptions contained within Section 2-5 for U.S. activities in Antarctica, NSF's proposed procedures pertaining to categorical exclusions go far beyond those allowed under Section 2-5(c) of the Order. Specifically, under that provision, an agency may only make categorical exclusions "as may be necessary to meet emergency circumstances, situations involving exceptional foreign policy and national security sensitivities and other such special circumstances." Yet, in its proposed 12114 regulations, NSF categorically excludes a wide variety of potentially harmful activities covered in its programmatic EIS, including transportation, fuel handling, collection of biological and geological specimens, use of explosives, research rockets, and other activities. See, Proposed 45 C.F.R. §641.24 (Appendix A). These categorical exclusions clearly go beyond the types of exclusions that are permissible under Section 2-5(c). Moreover, it should be noted that while the

Lawrence Rudolph
August 7, 1990
Page 5

Order requires NSF to consult with both the CEQ and the State Department prior to utilizing such exemptions, NSF's procedures do not provide for consultation with the State Department. See, Proposed 45 C.F.R. §641.21(b)(2).

Furthermore, even assuming that NSF can take these categorical exemptions, they would be redundant with provisions already contained within NSF's proposed procedures (see, proposed 45 C.F.R. §641.22(c)(1)) and they fly in the face of the recommendations contained within NSF's own December 1989 legal review. There, OGC declared that, "[a]lthough a programmatic EIS was completed for the U.S. Antarctic Program in 1980, the Foundation must still assess major site-specific activities impacting the Antarctic environment." See, Legal Review, at 26. Yet, NSF now proposes to exempt all activities subject to review under its programmatic statement for the U.S. Antarctic program. That EIS is ten years old and limited itself to assessing impacts "of the U.S. Antarctic Program at its current [1979] level." U.S. Antarctic Program Final Environmental Impact Statement, June 1980, at 4-1. Clearly the USAP has grown substantially, and the programmatic EIS is no longer adequate. NSF recognizes this and is currently pursuing a new programmatic EIS, but a draft of that document will not be circulated for public review until at least September 1990. In any event, even when that document is finalized, it will remain completely inappropriate for NSF to categorically exclude activities covered by it.

In addition to erroneously construing the scope of exemptions and categorical exclusions permitted under E.O. 12114, the proposed procedures narrowly define the definition of "significant effect" contained in the Order. Under Section 3-4 of the Order, "an action significantly affects the environment if it does significant harm to the environment even though on balance the agency believes the action to be beneficial to the environment" (emphasis added). The proposed guidelines implementing this definition exclude the language emphasized above. See, Proposed 45 C.F.R. §641.15(d). By deleting that language, the proposed procedures arguably would permit NSF to find that a scientific research project (e.g., taking of seals or penguins for conservation studies) or even development or expansion of a research base (e.g., to study global climate change or ozone depletion) may not do "significant harm" since on balance the project may ultimately prove beneficial to the environment. That result would not be consistent with the Executive Order, however, which by its own terms applies to projects with potentially positive benefits for the environment. Accordingly, the definition of "significant impact" in the final procedures should at least parallel the definition of the term contained in the Order.

In addition, NSF's proposed guidelines erroneously provide procedures for preparing "bilateral or multilateral environmental studies" or "concise environmental reviews," indicating that these environmental documents might be utilized instead of environmental impact statements. See, Proposed 45 C.F.R. §641.22(c)(2-3). Those documents may be issued for federal actions falling within Sections 2-3(b), 2-3(c) and 2-3(d) of E.O. 12114. See, Sections

Lawrence Rudolph
August 7, 1990
Page 6

2-4(b)(ii, iii, and iv). However, Section 2-4 of the Order requires that for "major Federal actions significantly affecting the environment of the global commons outside the jurisdiction of any nation (e.g., oceans or Antarctica)" an "environmental impact statement" (EIS) must be prepared. To be sure, a resource of global importance could be designated in Antarctica, thereby triggering Section 2-3(d) of the Order. However, it would be internally inconsistent with Section 2-3(a) to conclude that actions affecting such resources in Antarctica require something other or less than an Environmental Impact Statement. Accordingly, because the proposed procedures by their own description are meant to apply only to the U.S. Antarctic program, NSF may only issue environmental impact statements under the Order. See, 45 Fed. Reg. 28236. To correct this problem, NSF should delete all provisions relating to preparation of "bilateral or multilateral environmental studies" and "concise environmental reviews."

Finally, NSF's proposed procedures fail to implement Section 2-4(d) of the Order, which requires NSF to inform other federal agencies with relevant expertise of the availability of any environmental documents prepared under the Order. Indeed, the proposed procedures are barren of any mention of federal agency review of documents prepared by NSF under the Order. To address that problem, the final regulations should provide for timely notification and consultation with relevant agencies such as the U.S. Fish and Wildlife Service, Environmental Protection Agency, National Marine Fisheries Service, Council on Environmental Quality, Department of State, and others. These provisions should govern notice of all environmental documents prepared under the Order, prior to completion of such documents. Moreover, in this context, EDF notes that Section 2-1 of the Order requires NSF to consult with both CEQ and the State Department prior to placing the proposed procedures into effect. EDF strongly urges NSF to observe that provision and to incorporate the comments of those agencies to the extent they are consistent with the concerns expressed in this letter.

III. THE PROPOSED PROCEDURES ARE NOT CONSISTENT WITH ANTARCTIC TREATY RECOMMENDATION XIV-2 CALLING FOR PREPARATION OF INITIAL AND COMPREHENSIVE ENVIRONMENTAL EVALUATION PROCEDURES.

Although the U.S. successfully pressed other Antarctic Treaty parties to adopt "comprehensive environmental evaluation" guidelines quite similar to procedures required under NEPA at the 1987 Treaty meeting, NSF's procedures do not fulfill U.S. obligations to comply with those guidelines. Specifically, the Treaty parties recommended that an "Initial Environmental Evaluation" (IEE) be prepared for each proposed activity to determine whether it might "reasonably be expected to have a significant impact." If that evaluation indicates that the proposed activity "is likely to have no more than a minor or transitory effect on the environment," then the activity may proceed as long as it is accompanied by appropriate monitoring of impacts that do occur. Otherwise, a "Comprehensive Environmental Evaluation" (CEE) must be prepared. Among other things, that document must include a description of the proposed

Lawrence Rudolph
August 7, 1990
Page 7

action and feasible alternatives; likely direct, indirect, cumulative, and unavoidable impacts of the action; measures that will minimize such impacts; and the significance of anticipated environmental effects when compared with the advantages of the proposed action.

During the adoption of these procedures, there was much discussion surrounding the meaning of the term "significant environmental impact." This was because the decision to prepare a comprehensive environmental evaluation essentially turned on an interpretation of that term and the language "minor and transitory effect on the environment." Ultimately, the parties agreed that interpretation of these terms "may inevitably be a matter of judgment involving risk" and that such judgments were inherently a matter for national authorities. As a result, the parties recommended that each nation should develop criteria to determine whether particular activities would have "significant impacts" on the Antarctic environment. Despite that recommendation and the importance of preparing IEE's and CEE's, NSF's impact assessment procedures establish a much higher threshold of effect than that required to trigger preparation of a CEE. Indeed, NSF's standard triggering preparation of an EIS requires a finding of "significant harm" (See, Proposed 45 C.F.R. §641.5(d)), while the Treaty procedures only require an effect with more than a "minor or transitory impact on the environment" to trigger preparation of a CEE. Moreover, unlike the Treaty's assessment procedures, NSF's proposed guidelines do not provide for any monitoring of impacts associated with projects only requiring an impact assessment (i.e., IEE). As a result, the proposed procedures are inconsistent with Recommendation XIV-2 of the Antarctic Treaty parties.

In addition, even assuming that NSF's "significant harm" standard is the equivalent of that which triggers preparation of a CEE, the guidelines do not identify specific criteria for determining whether such documents should be prepared. In this context, NSF should refer to the 1985 publication of the Scientific Committee on Antarctic Research (SCAR) entitled Man's Impact on the Antarctic Environment. That publication, which led to adoption of the Treaty parties' impact assessment procedures, includes a detailed list of activities that "will always have a high probability of causing significant impact[s]" on the Antarctic environment and, therefore, require environmental assessments. That list, which is not meant to be exclusive, includes establishment and expansion of bases; increases in personnel; changes in power generation or fuel consumption; any operation affecting sterile or pristine areas; closing of stations; interference with endangered or unique systems, communities, or populations; operations adversely affecting SPA's or SSSI's; experiments designed to create adverse changes in the environment; application of biologically active substances; operations which might impede the recovery of an endangered, threatened, or depleted population; introduction of radionuclides; drilling operations; and marine seismic surveys. Unfortunately, although SCAR has determined these activities to be in a class with a high probability of causing significant impacts, NSF's proposed procedures seek to categorically exclude virtually all of them from review.

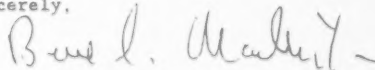
Lawrence Rudolph
August 7, 1990
Page 8

See, Proposed 45 C.F.R. §641.24, Appendix A.

Finally, NSF's proposed procedures do not necessarily entail review and comment of Environmental Impact Statements (i.e., CEE's) by other Antarctic Treaty parties, as provided under Recommendation XIV-2. To be sure, NSF's proposed guidelines indicate that EIS's will be prepared "to the extent possible and consistent" with its procedures implementing NEPA. See, Proposed 45 C.F.R. §641.22(c)(1). However, those procedures do not necessarily entail review and comment of CEE's by other Treaty parties. To address this problem, NSF's proposed guidelines should be revised to provide for State Department communication of all IEE's and CEE's to relevant foreign governments. Under Section 3-2 of the Executive Order, the Department is charged with coordinating all communications by agencies with foreign governments concerning environmental agreements and other arrangements in implementation of the Order. The Foundation's final guidelines should provide that the State Department will circulate all draft CEE's prepared by NSF to other Antarctic Treaty parties and those parties may submit comments directly to NSF (or through the State Department) on the CEE.

Thank you for your attention to these comments.

Sincerely,



Bruce S. Manheim, Jr.
Attorney, Wildlife Program

Thomas Le Blanc
Law Clerk, Wildlife Program

cc: Dinah Bear and Ed Yates, Council on Environmental Quality
Dave Colson and Tucker Scully, Department of State

Mr. BOUCHER. Thank you very much.

Ms. Sabella, we'll be happy to receive your testimony.

**STATEMENT OF SUSAN J. SABELLA, ANTARCTIC LEGISLATIVE
COORDINATOR, GREENPEACE, WASHINGTON, D.C.**

Ms. SABELLA. Thank you, Mr. Chairman, and thank you, members, for the opportunity to speak before the committee today.

I am Susan Sabella, Antarctica campaigner for Greenpeace in the United States. Greenpeace is an international environmental organization dedicated to the protection of our planet and its diverse ecosystems and creatures. Greenpeace has offices in 25 countries and five million supporters worldwide, approximately one-half of which are here in the United States. We also operate the only non-governmental base in Antarctica. World Park Base was established in 1987. Each year since then we have undertaken an expedition to Antarctica to observe and document environmental conditions in the region, to monitor the level of compliance with the Antarctic Treaty's protection measures, and, of course, to resupply and restaff our small station.

Over the course of our six years in the Antarctic, Greenpeace expedition and base teams have visited some 30 Antarctic facilities, including permanent, summer, and abandoned bases, and many of these several times. We have documented numerous environmental concerns and hazards, many that have been pointed out this morning, such as the open burning of solid waste and waste fuels; the discharging of untreated sewage into coastal waters; the landfilling of trash, including plastics, batteries, and medical wastes; fuel spills; and large scale construction projects. Despite many of these lingering problems, Greenpeace has, however, noticed a marked increase in environmental awareness and sensitivity on the ice, as well as within the Antarctic Treaty system as a whole.

We've seen environmental protection steadily climb the treaty's agenda, culminating in the conclusion of a draft protocol to the Antarctic Treaty on environmental protection earlier this month in Madrid, Spain. As you know, the protocol imposes a 50-year minimum prohibition on all commercial minerals activities in Antarctica. We do not view this protocol as a perfect agreement. It does not say everything that we would like it to say—it does not ban mining in Antarctica forever—but we do see it as a victory in the fight to have Antarctica permanently protected as a world park. We see it as concrete recognition that the world's community wants Antarctica to be preserved and not exploited.

We are confident that in 50 years all of the Antarctic Treaty parties, including the United States, will see the wisdom in permanently prohibiting Antarctic mining. Unfortunately, the United States has yet to signal its approval of this draft protocol and, to our knowledge, is the only Antarctic Treaty consultative party harboring some reservations about the agreement. Even Japan, Germany, and most recently the United Kingdom—all once staunch supporters of the Antarctic Minerals Agreement and also those countries most often characterized as the future miners of Antarctica—have come on side.

Greenpeace believes that the protocol contains perhaps the only workable arrangement at this time on the minerals issue. We find the draft protocol to be consistent with the Antarctic Protection Act of 1990, and we see no reason for the Administration's apparent reluctance to approve this agreement. Greenpeace considers prompt approval, therefore, of the draft environmental protocol to be our top domestic priority with regard to Antarctica and respectfully urges all members of Congress to support this agreement and work toward its furtherance.

However, Greenpeace does not consider this to be the right time for the introduction of new legislation on Antarctica. We are concerned that new legislation could delay, complicate, or perhaps jeopardize the future of the protocol. I believe Bruce has clarified this. We're talking about a rather short period of time before the document hopefully is adopted in Madrid this coming month and then subsequently submitted to the Hill for consideration.

With respect to the NSF Antarctic Environmental Protection Act, we are concerned that many of its provisions are incompatible with and often less stringent than those found in the protocol. For these and other reasons that I have detailed in my written statement and that I'm sure will come out in question and answer, we respectfully request that the act not be introduced at this time and that many of its provisions, particularly with regard to waste disposal practices, be rethought, and I'd just like to offer Greenpeace's assistance in this undertaking.

Thanks.

[The prepared statement of Ms. Sabella follows:]

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STATEMENT OF GREENPEACE USA

FOR THE SUBCOMMITTEE ON SCIENCE
 OF THE
 COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
 OF THE
 U.S. HOUSE OF REPRESENTATIVES

A HEARING ON THE NATIONAL SCIENCE FOUNDATION ANTARCTIC
 ENVIRONMENTAL PROTECTION ACT OF 1991

MAY 14, 1991

PRESENTED BY SUSAN J. SABELLA

At the XI Special Consultative Meeting (SCM) earlier this month, the Antarctic Treaty Consultative Parties (ATCPs) concluded the negotiation of a draft Protocol to the Antarctic Treaty on Environmental Protection. The Protocol designates Antarctica a "natural reserve, devoted to peace and science," and most significantly, imposes a minimum 50-year prohibition on all Antarctic minerals activities, including prospecting, exploration and development.

Greenpeace representatives monitoring the negotiations in Madrid, Spain characterized the agreement "as a victory in the fight to have Antarctic permanently protected as the world's first World Park." While not perfect, the Protocol and its minerals prohibition are concrete recognition that the world community wants Antarctica to be preserved, not exploited. Greenpeace is confident that in 50 years, all of the ATCPs, including the United States, will see the wisdom in permanently prohibiting all mining in Antarctica.

The Antarctic Treaty entered into force in 1961; the same year the Berlin Wall sharply divided Europe and the world. At the height of these Cold War tensions, the Antarctic Treaty succeeded in establishing one-tenth of the Earth's land surface as a demilitarized and nuclear-free zone. Antarctica, a land without national boundaries became a global laboratory, where countries could jointly pursue scientific research. The Antarctic Treaty is recognized as a landmark agreement that has effectively channeled competing national interests into an atmosphere of unprecedented international cooperation.

Thirty years later, the Treaty parties have before them another rare opportunity to help preserve the Earth's last continental wilderness. The Treaty parties have scheduled a final session of the SCM to be held in Madrid from June 16 - 21, 1991. Greenpeace is hopeful that the all ATCPs will endorse the Protocol at this meeting, and urges the U.S. to exert its leadership and influence as a world power and founding Antarctic Treaty state to this end.

Greenpeace thanks the Chairman and the other Members of the Subcommittee for the opportunity to speak on Antarctica today, and for drawing attention to this critical environmental issue. Greenpeace respectfully urges all Members of Congress to support adoption of the new Protocol on Antarctic environmental protection. We find this agreement to be fully consistent with U.S. policy as embodied in the Antarctic Protection Act of 1990. Greenpeace views furtherance of the Protocol to be the number one priority for Antarctica. With this in mind, Greenpeace does not believe that now is the proper time for new legislation on Antarctica. New legislation could potentially delay or complicate domestic approval of the agreement, and may even

jeopardize its future. For this, and other reasons, Greenpeace cannot support the National Science Foundation Environment Protection Act of 1991 (NSF Act) at this time.

THE ANTARCTIC ENVIRONMENT

Contrary to the standard depiction of this continent as a frozen wasteland, Antarctica abounds with remarkable wildlife. Vast colonies of penguins and seals, swarms of krill, whales, and diverse species of fish and seabirds live in a fragile coexistence, bound by the harsh environment in which they thrive. Antarctica is by far the largest wilderness left on this planet, and in many respects, it is the most fragile. It is this fragility that is a primary concern should the continent ever become the focus of major development activities. The terrestrial and fresh water ecosystems of Antarctica are extremely vulnerable. In the harsh climatic conditions prevalent in Antarctica, growth is very slow and recovery from disturbances can take years. For example, a footprint in a moss bed, left by a careless visitor, may remain unchanged for a decade in Antarctica.

The extremes of the Antarctic climate have forced incredible adaptability upon its inhabitants. But this adaption is dependent on a very small range of climatic activity. Any change in the water temperature or quality could significantly upset the marine ecology. Normally an ecosystem contains a wide range of levels and relationships. It is this variety and depth that gives the ecosystem stability. However, Antarctic ecosystems contain few levels despite considerable relationships. Consequently, impacts on such ecosystems have more profound effects. It is thought that a single krill species (*Euphausia superba*) may make up about half of the zooplankton biomass. This biomass feeds seals, whales, penguins, finfish, squid and seabirds. Reductions through human exploitation, or other human-induced disturbances, of any of these components of the marine ecosystem equation can cause an imbalance - an imbalance that in the Antarctic is not easily restored, by humans or nature.

WORLD PARK ANTARCTICA

In 1983, in part due to the opening of the Antarctic minerals negotiations, Greenpeace began an international campaign to preserve Antarctica, joining forces with the Antarctic and Southern Ocean Coalition (ASOC), an alliance of over 200 organizations concerned with protecting Antarctica. Greenpeace adopted the phrase "World Park Antarctica" to symbolize the goals of its campaign.

The term "World Park" was first used in conjunction with Antarctica in 1972 at the Second World Conference on National Parks. This Conference hoped to protect "the great scientific and aesthetic value of the unaltered natural ecosystems of the Antarctic" by having the continent designated as a world park. Since then, the term has become most closely associated with Greenpeace's and ASOC's efforts in Antarctica.

Over the years, despite the concept's speedy accession, "World Park Antarctica" has suffered from many misinterpretations and false accusations. Some individuals have characterized World Park as a giant fence around the Antarctic and the complete elimination of human activities there; scientists have alleged that World Park will infringe upon the freedom of scientific investigation or do away with Antarctic science altogether; ATCPs have claimed that World Park would require the dissolution of territorial claims, and would thus destabilize and perhaps destroy the Antarctic Treaty System (ATS); and finally other groups have interpreted World Park to be an elaborate scheme to promote Antarctic tourism. However, World Park Antarctica means none of these things.

World Park Antarctica can best be described by outlining the goals and principles of Greenpeace's Antarctic campaign. Some may be surprised to find that these goals and principles are very much aligned with the spirit of the Antarctic Treaty.

Greenpeace has established the World Park principles, a four-part code against which all human activities carried out south of sixty degrees South latitude shall be judged:

- * The Antarctic should be an area where wilderness values are paramount;
- * The Antarctic should be an area where there is full protection of flora and fauna (terrestrial and marine) and the environment (including the atmosphere);
- * The Antarctic should be an area of peace, free of nuclear and conventional weapons, and all military activities;
- * The Antarctic should be an area of scientific research which encourages cooperation between scientists of all nations.

As a World Park, Antarctica would be maintained as a peaceful, demilitarized, nuclear-free region. The wilderness qualities of the continent and of the Southern Ocean would be preserved, and conservation would be the paramount consideration when judging the acceptability of any and all human activities in the region. International scientific cooperation would continue to be fostered. Indeed, science should be the primary reason for human activity on the continent. All commercial minerals activities would be banned as inherently too damaging to the environment and

other qualities of Antarctica. There would also be a ban on the storage, discharge or incineration of toxic or radioactive waste, and the use of nuclear reactors for any purpose would be forbidden. The ecosystem approach to marine living resources management conceived under the Convention for the Conservation of Antarctic Marine Living Resources would be sustained. A management structure would be established to ensure that all activities undertaken in the Antarctic are managed according to a consistent set of standards, and to provide for uniform enforcement of rules, regulations and measures. Juridical arrangements made under the Antarctic Treaty with regard to territorial claims would remain in place.

GREENPEACE IN ANTARCTICA

In the austral summer of 1985-86, Greenpeace launched its first Antarctic Expedition as a means to assess the state of the Antarctic environment - to identify and record first-hand, actual environmental problems and threats in evidence on the continent. Since then, Greenpeace has undertaken six annual expeditions, and has established the only non-governmental base on the continent, in support of this environmental monitoring program. World Park Base is located on Ross Island, approximately 18 miles from the U.S. station, McMurdo. Greenpeace's monitoring program is carried out by both expedition and base personnel, and consists of on-site surveys of environmental conditions at national research stations, interviews with station personnel regarding environmental procedures and policy, and a program of soil, water (effluent), sediment, and biological sampling. Greenpeace teams also carry out various pollution studies in conjunction with a number of universities worldwide.

Greenpeace teams have visited some thirty bases and refuges on the continent, documenting waste disposal practices as well as the general level of compliance of base operations with ATS environmental provisions. Environmental conditions have varied greatly from facility to facility, with all but a few experiencing serious local impacts. Overall, most scientific stations have failed to comply with the minimum environmental guidelines and standards established under the ATS.

The 1990-91 Greenpeace Antarctic Expedition spent 5 months in Antarctica, resupplying World Park Base and visiting national stations along the Antarctic Peninsula. The Expedition also paid a short visit to McMurdo station, spent two weeks monitoring Soviet fishing operations in the vicinity of South Georgia Island, and deployed Greenpeace's first independent field team on King George Island. The team remained on King George for one month, carrying out an intensive environmental impact assessment of the Fildes Peninsula.

The Expedition, as in years before, encountered numerous environmental problems; some of which can be cleaned up and minimized, while others are more permanent. This year's team noted an increasing difficulty with the disposal of medical waste in Antarctica. Greenpeace members come across many used syringes, bandages, and vials among the garbage dumps at a number of bases. Fuel continues to take its toll. Expedition personnel saw first-hand the legacy of a 9-year old spill at the Chilean base, Arturo Prat. In 1982, an underground pipe ruptured, leaking 15,000 liters of fuel into the ground. Today, the area is still saturated. Moss beds ooze fuel when compressed, and nearby freshwater ponds still show a fresh sheen of oil. The familiar practices of open burning, feeding food scraps to seabirds, and stockpiling garbage and solid wastes continue at many bases. Poor compliance with Treaty Recommendation is unfortunately still the rule.

Despite these problems, however, Greenpeace personnel have recently noticed a marked increase in environmental sensitivity by many operating in Antarctica. One example of this was noted at the Argentine station, Orcadas. There, Greenpeace met the first Argentine national park ranger to work at one of his country's Antarctic bases. His role is to teach his colleagues about the local wildlife and minimize the impact of the station. Eventually, Argentina hopes to place these specially trained rangers at all its bases.

A full Greenpeace expedition report will be circulated to Antarctic Treaty parties, and made available to the public, in a few months.

THE NSF ANTARCTIC ENVIRONMENT PROTECTION ACT OF 1991 (NSF ACT)

As stated earlier, Greenpeace is convinced that the prompt approval and ratification of the draft Protocol on Environmental Protection is the most pressing issue with regard to environmental protection for Antarctica. Approval of the Protocol must be the top priority of the Government's immediate environmental agenda.

Therefore, Greenpeace is concerned that this is not the right time for new legislation on Antarctica. New legislation could potentially delay or complicate prompt approval of the draft Protocol. Moreover, the introduction of legislation prior to adoption of the Protocol could send confusing signals to the U.S.' Antarctic Treaty partners. Domestic legislation which is not linked to forwarding the draft Protocol could well be construed as competing with the agreement, and jeopardize its future.

For these reasons, Greenpeace recommends that the NSF Act not be introduced at this time.

In addition, the NSF Act raises a number of important questions that must be addressed before further action is taken on the Bill: What is the relationship of the NSF Act to the Antarctic Conservation Act of 1978 (ACA)? Are the provisions of the NSF Act consistent with those of the draft Protocol? Is NSF the agency best suited to assume responsibility for environmental protection and pollution control in Antarctica? And, finally, will the provisions of the NSF Act enhance environmental protection in Antarctica?

What is the relationship of the NSF Act to the ACA?

The intent of the NSF Act with respect to the ACA is not clear. Clearly, the NSF Act does not amend the ACA, but in a number of areas, the Act duplicates or conflicts with the ACA. The NSF Act restates the ACA's provisions on civil penalties and criminal offenses; sets new timelines for issuing and implementing pollution control regulations; and establishes the Director of NSF as the exclusive enforcement authority, as opposed to the ACA which gives this authority to the Director, as well as to the Secretaries of the Treasury, Commerce, Interior, and of the department in which the Coast Guard is operating. Is the intent of the NSF Act to override these provisions of the ACA?

Overlap and inconsistencies between the two Acts will result in confusion as to NSF's role and responsibilities, and could actually impede progress toward increased environmental protection for Antarctica. One way to avoid establishing competing requirements and standards would be to maintain the ACA as the chief U.S. statute concerning protection of the Antarctic environment, and update this law as necessary.

GP strongly recommends that the relationship between these two Acts be examined and addressed prior to further action on the NSF Act.

Are the provisions of the NSF Act consistent with those of the draft Protocol?

As stated above, the Antarctic Treaty parties have recently concluded a draft Protocol to the Antarctic Treaty on Environmental Protection. This draft Protocol addresses numerous issues pertaining to environmental protection in Antarctica, and updates the Treaty's detailed measures on the disposal and management of wastes, environmental impact assessment procedures, the conservation of flora and fauna, and marine pollution. The

draft Protocol's measures represent the Treaty parties' most recent thinking on environmental protection, and should be viewed as interim minimum standards for conduct on the continent. Domestic initiatives and legislation, therefore, should be consistent with, and as least as stringent as, the provisions of the Protocol.

In some areas, particularly that of waste disposal, the NSF Act is not in step with the draft Protocol. The NSF Act does not incorporate all of the measures contained in the Protocol's Annex on Waste Disposal and Waste Management, and in some instances, the Act permits activities that the Annex does not.

Article 1 of the proposed waste disposal Annex articulates four general obligations: to reduce as far as practicable the amount of wastes produced or disposed of in the Antarctic Treaty Area; to consider waste storage, disposal, removal, recycling and source reduction in the planning and conduct of activities; to remove as much waste as practicable from the Treaty Area for disposal elsewhere; and to clean up past and present land-based waste disposal sites and abandoned work sites. These fundamental obligations are not reflected in the NSF Act.

Additionally, the NSF Act does not contain many of the Annex's specific waste disposal provisions, including those prohibiting the introduction of polychlorinated biphenyls, non-sterile soil, polystyrene beads, chips or similar forms of packaging, and limiting use of pesticides; requiring the removal or sterilization of residues of animal carcasses, laboratory culture of micro-organisms and plant pathogens, and introduced avian products; and necessitating proper storage of waste prior to disposal.

The requirement to remove certain wastes from Antarctica is also not addressed in the NSF Act. The Annex states that certain wastes (including radio-active materials, electrical batteries, fuel, wastes containing harmful levels of heavy metals or acutely toxic or harmful persistent compounds, poly-vinyl chloride, polyurethane foam, polystyrene foam, rubber and lubricating oils, treated timbers and other products which contain additives that could produce harmful emissions) generated after the entry into force of the Protocol shall be removed from the Antarctic Treaty Area. It should be noted that while this provision is not technically effective until after the Protocol is in force, these terms are based on the 1975 Code of Conduct and Antarctic Treaty Recommendation XV-3 updating that Code, and therefore should be adopted as interim measures and incorporated into the Act.

The NSF Act also differs from the waste disposal Annex on the matters open burning and closed incineration. The Annex specifies that open burning "shall be phased out as soon as

practicable, but no later than the end of the 1998/99 season", and that pending this phase-out, "allowance shall be made for the wind and the type of waste to be burnt to limit particulate deposition and to avoid such deposition over areas of special biological, scientific, historic, aesthetic or wilderness significance including, in particular, areas accorded protection under the Antarctic Treaty." The NSF Act does not require a phase-out of open burning, nor does it stipulate special considerations and conditions for open burning to take place pending phase-out. In fact, the NSF Act would allow the open burning of certain wastes to continue indefinitely, through a proposed permitting system.

With respect to closed incineration, the NSF Act does not include the Annex's requirement for removal of incineration ash from the Treaty Area.

Finally, the intentional discharge of hazardous or toxic pollutants, ice staging, and the transport of hazardous or toxic pollutants to Antarctica with the intent to dispose of such wastes in Antarctica, all of which could take place under the NSF Act, are not explicitly permitted under the Annex, and in Greenpeace's opinion, are in direct contravention of the Annex's general obligations and the spirit of the Protocol.

Due to these fundamental differences, and the consistently weaker provisions of the NSF Act as compared to those of the draft Protocol, Greenpeace would not be able to support the Act.

Is NSF the agency best suited to assume responsibility for environmental protection and pollution control in Antarctica?

In the 1989 report "A National Science Foundation Strategy for Compliance with Environmental Law in Antarctica" (NSF Strategy), the NSF Office of the General Counsel (OGC) states that "[t]he ACA explicitly establishes NSF as the lead agency for pollution control, monitoring, and enforcement on the Continent." While there is little doubt that the ACA indeed has charged NSF with these duties, among others, the question remains as to whether NSF is the agency best suited to addressing these issues.

NSF's mandate is to promote basic scientific research. In many ways, the Foundation simply does not have the tools nor the expertise to execute fully environmental protection and pollution control responsibilities under the ACA. The Foundation must be required to seek advice and expertise from other governmental agencies, particularly the Environmental Protection Agency (EPA) and the Council on Environmental Quality (CEQ). These agencies' environmental expertise would complement NSF's Antarctic know-how

and greatly assist NSF in properly carrying out its environmental protection commitments in Antarctica.

In addition, NSF's mandate to promote science most often takes priority over NSF's responsibilities to protect and conserve the Antarctic environment, leading to policy conflicts and funding tradeoffs. A participant in a 1988 Congressional Research Service workshop on Antarctica commented, "What concerns me is that I keep on hearing the word 'trade-off' -- that there is a trade-off in terms of funding, that there is a trade-off in terms of logistics, and it seems to me that consistently the environment has suffered because of that trade-off."

The acknowledgement by OGC that NSF bears regulatory and enforcement responsibilities under the ACA does not mean that NSF has lived up to these obligations. It is well known, for instance, that the Director of NSF has yet to designate pollutants in accordance with section 6(b)(6) of the ACA; nor has the Director specified "those actions which must, and those actions which must not, be taken to prevent or control the discharge or other disposal of pollutants, from any source with[in] Antarctica" as required by section 6(b)(7).

It is also well known that the 1983 internal directive which NSF issued with the stated purpose of implementing these sections of the ACA, concluded that "formal regulations are neither necessary or appropriate at this time." Furthermore, the NSF Strategy acknowledges that the directive is intentionally weaker than the Treaty's 1975 Code of Conduct, the Recommendation on which the directive is modeled. The weakening of these standards suggests that NSF never intended to hold itself accountable to the Agreed Measures or the Code of Conduct.

Lastly, Greenpeace Expedition and Base teams have confirmed that U.S. operations in Antarctica have regularly exploited the loopholes in the ACA and internal directive, contributing to a long history of environmental neglect in Antarctica.

To be sure, Greenpeace acknowledges the considerable strides that NSF has made in recent years to alleviate many of the environmental problems existing at U.S. facilities. Each season now sees millions of pounds of waste materials retrograded from the continent. Macerators have been installed at McMurdo and Palmer to grind sewage, and an interim hazardous materials storage site was also established at McMurdo. A program of trash separation and recycling is in place at McMurdo. All of Palmer station's solid waste is now retrograded to South America. The Foundation has also secured much-needed additional funding to address environmental problems at USAP stations.

However, despite signs of "greening" within the Foundation, Greenpeace believes that allowing NSF to continue its practice of self-regulation and self-enforcement is unwise. This is particularly true, as the NSF Strategy has also concluded that very few U.S. environmental laws apply to Antarctica, including the Clean Air Act, Clean Water Act and the National Environmental Policy Act. In other words, it is NSF's opinion that its actions in Antarctica are not bound by domestic environmental legislation.

For these reasons, Greenpeace finds it very disturbing that the NSF Act would further consolidate responsibility for environmental protection and pollution control in Antarctica with NSF. As stated earlier, unlike the ACA, the NSF Act does not require consultation, or provide for joint enforcement authority, with the Secretaries of the Treasury, Commerce, or Interior, nor does it require consultation with EPA, CEQ or Coast Guard, all of which have relevant expertise.

Moreover, the Bill's provision for an environmental audit and investigative authority hardly constitutes independent oversight or an impartial inspection. The panel and its chairman are selected by NSF's Director. The panel's audit report must be submitted to the Director for comment, and the panel is directed to consider the comments of the Director. Finally, the Director has the power to reject any of the panel's recommendations before submitting an implementation plan to the Office of Budget and Management.

Greenpeace strongly recommends that the NSF Act require NSF to consult and share enforcement authority with the Secretaries of the Treasury, Commerce, Interior, and for the department under which the Coast Guard operates. The Act must also require NSF to consult with EPA, CEQ and Coast Guard on issues with which these agencies have expertise. Finally, a citizens' suit provision should be added to the Act. Without these changes, Greenpeace would not be able to support the legislation.

Will the provisions of the NSF Act enhance environmental protection in Antarctica?

For the above reasons alone, Greenpeace must conclude that the NSF Act would not diminish environmental impacts associated with U.S. operations in Antarctica, nor enhance environmental protection generally in Antarctica. There are, however, further grounds for concern with the legislation.

The Act consistently sets very long timelines for the institution of its provisions, often causing unnecessary delays. For example, the Act institutes a deadline of June 1, 1993 for the

issuance of regulations designating pollutants, and the establishment of a permit system to control their discharge. As described earlier, these regulations were originally called for under the ACA, and are more than 20 years overdue. Greenpeace wonders how a further delay can possibly be justified? Moreover, NSF has already stated that these regulations will be completed in 1991.

Greenpeace also takes issue with the March 1, 1993 deadline for wastewater system protection procedures. Problems with McMurdo's wastewater effluent, including the presence of heavy metals, were identified as early as 1983, when the "McMurdo Water Quality Study" was completed. Greenpeace samples taken from McMurdo's outfalls between 1986 and 1988 revealed elevated levels of heavy metals including silver, chromium, zinc, copper and lead. Various organic compounds were also detected including three EPA priority pollutants: 1,2 - dimethyl benzene, naphthalene, and biphenyl. The NSF Act should require that procedures to ensure the protection of McMurdo's wastewater, in particular, be instituted immediately.

There are other problems with deadlines and schedules. The Act states that by March 1, 1995, "the Director shall either implement a program of complete retrograde of solid waste or construct an incinerator at McMurdo Station...." NSF issued a statement on March 21, 1991 explaining that the Foundation would be installing a temporary incinerator at McMurdo for the upcoming austral winter. The release went on to state that the temporary device would be replaced by a "three-chambered, state-of-the-art incinerator" in October 1991. The Act's 1995 deadline is meaningless, as the decision to incinerate this year has already been made.

The same situation exists with the Bill's terms for the processing of human wastewater. The Act sets a deadline of March 1, 1993 for the maceration and dilution of human waste prior to disposal in Antarctica's coastal waters. NSF's two coastal stations already macerate and dilute sewage.

The Act also does not specify a date by which the Director will develop and implement an environmental monitoring program.

Furthermore, Greenpeace disagrees with many of the NSF Act's basic policy decisions. As explained above, Greenpeace cannot support the decision to allow for permitting of open burning, ice staging, the disposal of toxic or hazardous materials or the transporting of wastes - toxic, hazardous or otherwise - to Antarctica for the expressed purpose of disposal there. Such activities are extremely dangerous, and have no place in environmental protection legislation. Greenpeace could not

possibly endorse legislation with a permitting system for these activities.

Greenpeace also takes issue with the NSF Act's sanctioning of closed incineration, and its lax provisions for handling of human wastes. Untreated human waste can pose serious problems for the local marine environment. The introduction of such wastes can alter the productivity of organisms living near the discharge, causing some members to flourish and others to decline. The report "Waste Management Practices of the United States Antarctic Program" (1989) remarked that a "significant algal population was noted on the open water adjacent to the outfall" at McMurdo station during a January 1988 visit. In addition, the disposal of untreated domestic effluent may result in the introduction of alien bacteria and viruses into the local Antarctica environment. The "McMurdo Water Quality Study" detected high amounts of fecal coliforms in McMurdo's effluent, "as one would expect to be associated with raw sewage." The report notes that "pollution studies have correlated the occurrence of pathogenic bacteria with levels of fecal coliforms...." Greenpeace continues to call for the use of dry toilets at year-round Antarctic installations, and a minimum of primary treatment for sewage.

Incineration, whether in a state-of-the-art incinerator or in an open pit, violates the environmental integrity of the Antarctic. Many modern products such as ordinary cleaning products, plastic packaging, newspapers, cans, and personal hygiene products all contain toxic substances, ranging from heavy metals in inks and cans to dioxins in paper products. When this refuse is burned, volatilized metals and toxic organic chemicals are released into the air and concentrated in the ash. Indeed, refuse incinerators have been identified worldwide as sources of airborne metal contaminants as well as dioxins, furans and other toxic chemicals. Greenpeace opposes the installation of further incinerators on the continent, and urges that existing incinerators be phased out. Greenpeace supports total retrograde of all solid wastes from Antarctica.

Greenpeace continues to have serious concerns with respect to NSF's proposed implementation of Executive Order 12114. The proposed procedures were riddled with loopholes including categorical exclusions for transportation via ship, airplane, helicopter, or surface vehicle; fuel handling and storage within existing stations; accidental discharge of oil or hazardous substances or materials; as well as scientific research activities involving the low volume collection of biological and/or geological specimens, small-scale detonation of explosives, the use of radioisotopes in scientific experiments, and other specified activities. Furthermore, the procedures would exempt any activity covered by a USAP Programmatic Environmental Impact Assessment from further assessment. In

addition, Greenpeace finds the lack of public notification for environmental impact assessments and environmental reviews to be most troubling. These issues must clearly be addressed, either through legislation or in NSF's final regulations, for NSF's impact assessment procedures to be worthwhile.

Generally-speaking, the NSF Act fails to move aggressively on the protection front. Much of what the Act calls for can already be found in NSF's Environmental Protection Agenda or in the NSF Strategy and implementation plan. In other words, the Act does not push or challenge NSF. It rubberstamps NSF's existing plans and schedules, and in some cases, the legislation even retreats from current practices and plans. In its present form, Greenpeace cannot endorse this legislation.

CONCLUSION

In 1959, the Antarctic Treaty was bold and progressive. It was a shining example of international friendship at a time of close-mindedness and distrust. The draft Protocol on Environmental Protection affords the Treaty System with another opportunity to take courageous new steps. It is clear that Antarctica deserves the strongest environmental protection possible, particularly to be placed off-limits forever to minerals and oil exploitation. Prompt approval of the Protocol on Environmental Protection by the United States would be a significant milestone toward this goal. Furthering the Protocol must be the top priority for Antarctica. For these reasons, Greenpeace urges that the NSF Act not be introduced at this time, and that many of its provisions be rethought. Greenpeace would be happy to assist the Subcommittee in this undertaking.

Mr. BOUCHER. Thank you very much, Ms. Sabella, and the Chair thanks all of the witnesses for their very careful review of the legislation that has been proposed and their very extensive comments here this morning.

We have duly noted the recommendations that these witnesses have made with regard to the time frames that are contained in the legislation, and we will consider those remarks very carefully. We also note with interest the comments concerning possible timing of introduction of a bill, and we'll consider your recommendations in that regard. And that brings me really to the third recommendation that you made, and that is that any legislation should apply a variety of current U.S. environmental statutes to activities in the Antarctic.

The response that we've heard from those who are conducting research with regard to that recommendation is that because of the unique conditions that exist in the Antarctic that the U.S. environmental protection statutes specifically applied to all activities there would unduly disrupt scientific research. Is there, in your view, any merit in that? And I guess the broader question is do you see an aggressive and sustained program of research in the Antarctic as being compatible with your environmental protection objectives?

Ms. Hurwich?

Ms. HURWICH. Yes, I certainly do. We very much support an aggressive scientific program in the Antarctic, and we don't envision or want to see any conflict between the environmental standards and furtherance of science, especially the U.S. program. In the United States, scientific activity has to comply with all of our domestic regulations, and we haven't found that this is unduly hampering. I don't see why U.S. activities in Antarctica should bear a different standard than we do at home. I mean, I personally think that it's hypocrisy to say we can go to Antarctica and not have to comply with the standards we apply at home.

Mr. BOUCHER. Do you not concede that there are special conditions based on climate, weather, and the like that make, for example, the disposal of substances extraordinarily more difficult there than here? And many other examples, of course, can be raised.

Ms. HURWICH. I do, and, in fact, I know in the draft legislation you have this clause that the same degree of environmental protection as provided for by environmental laws of the United States shall apply consistent with special safety considerations and operational requirements. But these terms are not defined, and I think they provide a very large loophole that would need to be tightened up, if not closed, by trying to clarify what are the special conditions, what would apply when you—what exactly—were we to extend the application of U.S. laws, how would they need to be modified to have the best protection in Antarctica, given scientific activities. That's what I recommend, that Congress initiate such a study.

Mr. BOUCHER. Well, I think that's a very helpful reply, and let me ask you this. Is there room for us to have discussions on how we might better define those terms in a way that would satisfy your objectives?

Ms. HURWICH. Certainly. We're open to help you in any way we can.

Mr. BOUCHER. All right. Very good.

Let me ask you very broadly this. What do you see as the greatest environmental threats to the Antarctic today, based on current activities or what you think may happen in the future?

Mr. Manheim?

Mr. MANHEIM. Mr. Chairman, I suppose the answer to that question hinges on what happens about a month from now in Madrid and whether the United States and perhaps a couple of other countries oppose this Madrid protocol, which, as you know, contains a very important provision dealing with commercial mineral resource activities. I think everyone recognizes that those activities are well down the road in the form of taking place, but nonetheless critical decisions on whether, in fact, they will take place and if they do take place, what would govern such activities, are being made today. And, therefore, I think at least our organization considers among the most serious threats to Antarctica commercial mining activities. That's not, however, to diminish the specific activities that are currently taking place in Antarctica and the impacts that they are having on Antarctic wildlife or the environment there.

If I could just also take the opportunity to briefly respond to your first question, which is sort of a two-part question regarding whether environmentalists share scientists' concern for protection of Antarctica as a pristine natural laboratory, in fact, we certainly do, and we think that vesting agencies with particular environmental expertise like the Environmental Protection Agency, the U.S. Coast Guard, the National Oceanic and Atmospheric Administration, who have accomplished records in dealing with environmental problems, is the better way to go. Those sorts of agencies will be able to avoid problems like the Winter Quarters Bay and the tremendous concentrations of PCBs and heavy metals and organics that occur in bottom sediments there or the disruption of scientific research that occurred from the Fortress Rock landfill site with skuas coming in and scavenging up in dumps. Even NSF's own recent programmatic statement admitted that that site has seriously disrupted all sorts of ornithological studies in that area.

And finally, with respect to the notion of undertaking these practices within an extreme environment, the other side of the coin is the disposal of wastes in that sort of extreme environment has more serious and potentially long-lasting, if not permanent, effects than it does outside of such areas.

Mr. BOUCHER. But I think the real problem is that U.S. environmental laws in their existing form were not written with the anticipation that they would be applied in such an extraordinary environment as Antarctica, and what we've attempted to do in our draft legislation is specifically tailor a bill to those unique needs. Now, I think there may be some room for discussions as to how we better define the terms, but I personally have some problem with taking existing environmental statutes drafted for application in the United States and applying them word for word in such a unique circumstance.

Ms. Sabella?

Ms. SABELLA. Yes, if I could just add one thing. On this point, I think it should also be reminded that the Antarctic is a near-pris-

tine wilderness area. It has been given special conservation status under some of the previous recommendations under the treaty, and it potentially will be designated a natural reserve for science and for peace. I think that it deserves, in some cases certainly, more stringent measures than those applied at home. For example, my organization would not support and does not support the installation of an incinerator in Antarctica. We feel that given the special circumstances of Antarctica, some of the things that we do at home are completely out of line in Antarctica. So I think that that point has to be, you know, kept in mind when we go through this drafting procedure.

Mr. BOUCHER. Well, let me just suggest—I appreciate that answer. I think the real difficulty we face is how do we maintain the Antarctic as a platform for a broad range of scientific experiments consistently with your environmental protection objectives in what is a pristine environment and a very difficult pristine environment to preserve. If you go far enough in requiring environmental preservation by applying existing laws or those that may, by your suggestion, be even more stringent, I think you necessarily impede the ability of researchers to conduct their experiments. That's the problem. That's the balance we have to achieve.

Mr. Manheim?

Mr. MANHEIM. Mr. Chairman, there are, in fact, some laws that have been written to apply to Antarctica, in our view, and one of those is the National Environmental Policy Act. So this bill, were it introduced, would essentially preempt application of NEPA not only for NSF, but for all Federal agency activities and their licensees or permittees in their activities in Antarctica, and that we cannot support. Both the State Department and the CEQ, contemporaneous with passage of NEPA, construed it to apply to Antarctica, and I don't think it's proper for this committee or any other committee to preclude application of NEPA now.

Mr. BOUCHER. That's a matter of legal debate, I think, as to whether it does apply or does not apply to Antarctica. In fact, that's about to be tested, as I understand it.

Ms. HURWICH. I would like to make a couple of comments with respect to this discussion. One is to note that there are U.S. laws that apply in extreme regions in the Alaskan arctic, which weakens that argument, and secondly, to say that I believe the greatest threat to Antarctica at this moment really is that the U.S. doesn't fully support this Madrid protocol, and the opportunity that we have now for a consensus of all the treaty parties on the most important environmental protection agreement since the Antarctic Treaty—that would be the greatest loss.

Mr. BOUCHER. Well, let's assume that the U.S. does support the Madrid protocol and that it is ratified in due course by the U.S. Senate and by the other signatories to the treaty. In that event, would your view of this legislative initiative be more favorable?

Ms. HURWICH. Well, then I would feel that the legislation would need to be better adopted to implement our international obligations.

Mr. BOUCHER. Is there anything in the bill that is inconsistent with the protocol? As I read it, it says that any agreement by the treaty parties would become a necessary minimum condition for

enforcement by the NSF, which in turn could be added to by its own regulations or by subsequent statute, but as an absolute minimum condition, there would have to be enforcement of all the provisions agreed to by the international parties. So would there be anything inconsistent with the protocol contained in this bill?

Ms. HURWICH. Well, it may not be in direct conflict, but I think there can be a better matching of the bill with our obligations. There are some areas where the annexes actually provide greater breadth than the bill does, so although they're not—

Mr. BOUCHER. Could I ask you to submit in writing for the subcommittee's consideration a summary of those specific areas where the protocols do in fact require more breadth? We would like to review that.

Ms. HURWICH. Sure.

Mr. BOUCHER. Okay. Thank you very much.

I have a number of other questions, but at this time I'm going to recognize my colleagues, who have been waiting very patiently.

The gentleman from California, Mr. Packard?

Mr. PACKARD. Thank you.

The NSF testified this morning that there will probably be a consensus on the provisions of the Madrid protocol, but it will not only be difficult for the several nations to implement it, but it will be very time-consuming. Do you agree? Do you feel that the time limits—three or four years of implementation—is realistic?

Ms. SABELLA. I wasn't certain that Dr. Wilkniss was speaking about just implementation. I think there was some meandering about the ratification process as well perhaps taking quite a while. In terms of implementation, I think that we can't ignore that it will be somewhat difficult for certain nations to implement these activities as quickly as others. I think the U.S. is probably the best-suited to take the lead on implementing this, and we've encouraged the National Science Foundation and other national operators, through the Antarctic Treaty system, to share technology, share expertise, in making sure—to facilitate quick implementation of past recommendations as well as the recommendations housed in these protocols. So I think it's a very achievable thing if international cooperation is going to prevail or can prevail to that degree in Antarctica.

Mr. PACKARD. Do you think a legislative strategy would be equally lengthy in implementation?

Ms. SABELLA. I'm sorry. This legislative strategy?

Mr. PACKARD. Yes.

Ms. SABELLA. Well, I think, as Bruce pointed out, it sets rather lengthy deadlines, so in some respects—

Mr. PACKARD. But those deadlines in reality could be before. If an implementation of a protocol track would be three to four years, it's possible that the deadlines in the bill would actually implement even before the protocol would implement. That's the whole point of my question. Your concern was that we're delaying by the legislative strategy, and the protocol could be adopted next month, but, in fact, it's not so much the adoption as it is the implementation in terms of time.

Mr. MANHEIM. Mr. Packard, in my earlier remarks, I tried to suggest that there are sort of two different time lines here. One

simply, I think, concerns when and if the U.S. ratifies this agreement and whether we should consider that the Congress should consider implementing legislation at that time as opposed to the international community of all 26 Antarctic Treaty consultative parties approving the protocol, and then it technically enters into force for all of the other parties.

In our view, Congress does not need to wait for all of the other 25 Antarctic Treaty consultative parties to ratify the Madrid protocol before adopting legislation that imposes fairly expeditious deadlines on our agencies operating in the Antarctic environment. The only thing, in our view, Congress needs to wait for is the Madrid protocol to get to the Hill and for the Congress to approve of it.

Ms. SABELLA. If I could just make a point, I don't see the U.S. having a difficulty with prompt implementation, as Bruce said. I think it's the other countries—and I think Dr. Wilkniss was referring to this as well—that there are some countries within the Antarctic Treaty system, not the United States, that will have a difficult time or a more difficult time with swift implementation of the protocol's annexes.

Mr. PACKARD. We have not talked about tourism. Do you feel that tourism is equally responsible for environmental problems as is the research efforts of the international community in the Antarctic?

Ms. SABELLA. The problem is that research efforts have been around for a whole lot longer and that they have land-based facilities and that they generate a whole lot more waste, in most cases, than tourism. So in some respects, it's not really a fair comparison. I think, as you'll hear from my colleagues who focus more on tourism than my organization does, tourism, however, is a growing industry that needs our attention nationally as well as internationally. But I think at the moment, if you look at the Antarctic, most of the pollution problems presently are coming from—and naturally so—scientific research stations.

Mr. PACKARD. What is your recommendation on disposal if incinerators and current disposal practices or past disposal practices are unacceptable? What is the environmentalists' proposal in terms of disposal?

Ms. SABELLA. Greenpeace supports 100 percent retrograde of solid wastes. We don't support disposal of any solid wastes on the continent or within the Antarctic Treaty area. I realize that the National Science Foundation has come up against a bit of an obstacle with USDA regulations with respect to food-contaminated wastes, and I hope that they can surmount that obstacle.

Mr. PACKARD. Thank you, Mr. Chairman. I have no further questions.

Mr. BOUCHER. The Chair thanks the gentleman.

The gentleman from Maryland?

Mr. GILCHREST. Thank you, Mr. Chairman.

Incineration—if it isn't incinerated in the Antarctic, where would it be disposed of? Where would you recommend that material be disposed? Would it be incinerated in the States, Australia? Would there be some place where it could go?

Ms. SABELLA. Yes. We recommend retrograding the waste to preferably the country of origin, but at least outside to another coun-

try, you know, where arrangements have been made for disposal outside of the Antarctic Treaty area. We don't recommend a specific form of disposal in those countries, but, again, we're talking about a region that has been given and is about to be given special designation as a natural preserve, and we all understand that in order for science to continue there, it needs to be a clean and pristine area. So basically we're talking about removal of waste for disposal elsewhere.

Mr. GILCHREST. Okay. So then I assume that an incinerator that incinerated to the degree where it only released, let's say, carbon dioxide and water, that would still be unacceptable?

Ms. SABELLA. I don't know of an incinerator that does that. I mean, most incinerators, even municipal incinerators, in this country have been pinpointed as sources of dioxin, furans, and mercury in their effluent.

Mr. GILCHREST. I see. If there was an incinerator that released nothing but—if there were, and I have been told that there are—they're working on one in my own district, which I'm not sure I want, to incinerate mustard gas.

Ms. SABELLA. I'm familiar with that incinerator.

Mr. GILCHREST. And I have been told by a number of sources that the incinerator that they could build—and I'm still looking into this, because I don't know—would release nothing but carbon dioxide and water. If that is possible, is that kind of thing acceptable?

Ms. SABELLA. Again, I don't know. I think it's kind of hypothetical. I would say no. One of the problems with incinerators is that they also tend to cripple other disposal methods. You tend to see an incinerator built. It costs a lot of money. It's supposed to only deal with non-toxic, non-hazardous, non-polluting forming materials, such as just household waste or domestic waste, and slowly you see recycling efforts crippled by the introduction of these other types of, you know, materials—materials that would have been recycled or would have been removed.

Mr. GILCHREST. So an incinerator is another—

Ms. SABELLA. So this is a secondary problem that investment in an incinerator tends to slow down other more environmentally compatible—

Mr. GILCHREST. It's another stumbling block in recycling material.

Ms. SABELLA. Yes, that's what we've seen in the States.

Mr. GILCHREST. Okay.

Do you see—and anyone can answer this—scientific research and a pristine environment as diametrically opposed? Are they incompatible? Can we have both in the Antarctic?

Mr. MANHEIM. I think we have to have both in the Antarctic. I think that's absolutely critical, and I don't think that the measures that we've been calling for for the last several years in any way defeat the notion of protecting Antarctica as a pristine natural laboratory. Clearly, the more protective the measures are that protect this natural laboratory, the better science one is going to do in Antarctica. The more pristine the atmosphere, the better it will be as a global monitoring laboratory for ozone depletion or global climate change. To have Antarctica littered with dioxins or PCBs emitted out of incinerators can only conflict with what I think ev-

everyone agrees is an important purpose, and that being to utilize Antarctica as a natural laboratory.

Ms. HURWICH. I just want to reiterate that the organizations that I'm speaking for, many of which are made up of scientists, fully support Antarctic scientific research and the maintenance of a pristine environment.

Mr. GILCHREST. You mentioned before that the same type of environmental regulations applied in the United States should apply to the Antarctic, and, you know, there's been some discussion on the type of environment and the difficulties and so on. I think our mind set should be that even if there are difficulties that we should ensure that whatever regulations are down there maintain that pristine environment. Can you point out from any of your research specific scientific activities that have affected adversely the environment that's down there and how a stricter environmental set of regulations could control that?

I guess what I'm trying to say is there are certain types of environmental—certain types of research activity that goes on down there that, because of the environment, it's different that laws present in the United States do not apply. As a result of that, could you tell us what adverse impact that research has done and what would you suggest—how could we change that?

Ms. HURWICH. I just want to briefly respond before I pass this question to my colleagues who have more background on the scientific activities there, but most of the problem with the scientific activities there is the logistical support for the activities for the year-round bases and all the personnel. In that sense, the practices that don't conform with U.S. law, like just basic incineration, open burning, you know, these don't meet the requirements of the Clean Air Act, for instance. Discharge of human wastewater doesn't meet U.S. law. So it's the support for scientific activities that usually is a problem.

Let me hand it to Bruce or Sue.

Ms. SABELLA. Basically, that's the point, and I think we all feel that way, that it's not necessarily individual research projects or research per se that is having an impact. Perhaps in some cases that I'm not familiar with it is. I'm not familiar. But it is indeed the waste disposal aspects, base construction, other logistical support, fuel handling and storage, those types of activities that are having the greater impact on the environment.

Mr. GILCHREST. Under present conditions, then, do you feel that—and I think I understood this correctly—that the permanent South Pole observation post—in your mind, does that pose any further problems, since logistical problems seem to be the source of the pollution?

Ms. SABELLA. Well, the South Pole, having never been there, I don't believe that it has the same type of vulnerability, say, that the coastline does, as the coastline is an ice-free area where you find the vast majority of wildlife living and breeding. So I'm not quite certain—I'm not that familiar with exactly what this project will entail. If I understood the National Science Foundation representatives correctly, though, this is going to be an international facility, and if it is, we certainly support that aspect of it. The more we can get internationally funded, based, and utilized facilities, you

know, joint facilities, the fewer facilities, hopefully, we will have to have altogether.

Mr. GILCHREST. Fine. I would hope that all of us— the scientific community, the environmental community— could, instead of seeing the differences that occasionally arise between the two groups and all of us, if we could see the end result, what we want the Antarctic to look like not only in 100 years, but maybe 200 years. And then if we agree what we want it to look like, I think we can then work through some of the obstacles that are generated between us and look to the solutions rather than the potholes. Thank you very much.

Thank you, Mr. Chairman.

Mr. BOUCHER. The Chair thanks the gentleman and again expresses appreciation to these witnesses for their testimony here today, and the Chair would say to each of these witnesses that this committee very much looks forward to having future discussions with you on a subject of mutual interest. We'll take your recommendations into account, and any further suggestions that you have for us, we would be pleased to receive in writing. Thank you very much.

Mr. BOUCHER. We are now pleased to welcome our third panel of witnesses, including two very distinguished scientists—Dr. Rutford and Dr. Sullivan—who have been involved in Antarctic research activities for most of their careers. We hope that their comments will include any concerns that they may have about how the proposed legislation will affect the conduct of research in the Antarctic and any responses that they might have to the statements of witnesses on the preceding panel.

We also welcome today Mr. Robert Craig, the President of The Keystone Center, who has had extensive experience with problems associated with human activities and hostile environments and who served on the National Science Foundation panel on safety in Antarctica. That safety panel examined all aspects of U.S. operations, and the findings of the panel led to the major NSF Antarctic health, safety, and environment initiative which is now under way.

Without objection, the prepared statements of each of the witnesses will be made a part of the record. The subcommittee will be pleased to receive their oral summaries, and, Dr. Rutford, we'll be pleased to begin with you, sir.

STATEMENT OF ROBERT H. RUTFORD, PRESIDENT, UNIVERSITY OF TEXAS AT DALLAS, RICHARDSON, TEXAS

Dr. RUTFORD. Thank you very much, Mr. Chairman. It's a pleasure to be here to testify on this legislation.

I might add that the scientific community—the Antarctic scientific community—is far too often not represented at hearings like this, and too often we see the Washington-based interest groups testifying on such legislation without the opportunity from those of us out in the hinterlands to make similar statements, and I think you need to know that my colleague, Dr. Sullivan, had to scrounge the entire University of Southern California campus to find travel funds to be here today, and only because I'm the university presi-

dent am I able to be here today. We heard in earlier testimony the need for a level playing field when it comes to legislation like this, and I think the Congress needs to pay particular attention, when you have differing views on legislation and activities, that you somehow provide for those different views to be heard, and I'm glad we can be here today.

As you all know, the United States Antarctic Program is recognized as the premiere research program in Antarctica. It began during the International Geophysical Year back in the 1950s, with a wide variety of scientific disciplines having been part of this research activity. I think the U.S. can be extremely proud of the accomplishments of the program, and we hope that that can continue with a minimum of constraints on the various research programs.

The U.S. Antarctic Program began in 1957 during the International Geophysical Year, and at that time there were no plans for the continuation of the scientific programs in Antarctica. It was a 12-to-18-month program. Bases were built, and they were built with the notion that they would last for 12 to 18 months, and then that would be it. Following the International Geophysical Year, the decision was made by the U.S. Government to continue research activities on the continent, and stations that had been built with a single year's operation in mind all of a sudden became the home for expanding programs, and in the ensuing years additional stations have been constructed. Some were abandoned, but the end result was support for a U.S. science research program that was very active and vital in a trend that continues to this day.

So the U.S. has had a continuous presence in the Antarctic for about 35 years. In addition, there are 24 other countries conducting research and activities, and it's important that we understand that these activities are an intrusion into an environment that has no indigenous human population, and it must be understood that the Antarctic environment is not fragile—in other words, if you bump it, it doesn't break—but it's plastic, and it will give a little bit.

As a field geologist, I've had the opportunity to walk and work in many areas where no other human being has ever walked, and it's a humbling experience, and it makes one aware that the conduct of science in such an environment must, of necessity, be one of certain tradeoffs. To do science, we must intrude. The secret is to make that intrusion minimal. To not intrude means there will be no scientific research carried out, and to do research without sensitivity to the environmental issues is to intrude unnecessarily.

As the environmental awareness has increased here in the United States, so too has it increased in the Antarctic. The majority of the laws regarding U.S. environmental protection have not taken into consideration the problems associated with their application in areas such as Antarctica. And the strict application of these laws is probably not possible without having a major impact on the ability to conduct research. It is not a matter of conducting research with no regard for the environment, but rather that the implementation of the requirements would have a major impact on the available funding and support for research.

In the past, given the limited budget, the decision was to do research and to make the necessary environmental improvements as funds became available. Some have argued that this was not and

should have been done, but given the minimal scale of the environmental problems, it was, I believe, the prudent decision. Considerable progress has been made more recently in the cleanup, mitigation, and prevention of environmental damage. To suggest to you that there were no mistakes made in the past is to ignore the facts. There were many things that were done in the past that are not done today.

A careful look at the proposals for some of the environmental improvements leads one to the conclusion that some of them make no sense in Antarctica. For example, the matter of landfills. The primary problem with the operation of landfills in the United States deals with leaching problems, yet in an area of permanent frost, leachate liquids have minimal impact. We give serious thought to the disposal of untreated human waste at coastal stations, and yet the amount of waste added to the water by a station like McMurdo is almost negligible when compared with that poured into the sea by natural inhabitants—the penguins and the seals.

This proposed legislation that we are considering here places the responsibility and the authority for environmental issues in Antarctica squarely on the shoulders of the Director of the National Science Foundation, where it properly should be. As the agency responsible for the U.S. Antarctic Program, it seems quite appropriate that the NSF should be tasked with the development of the standards, with the protection measures, and carrying out the monitoring and environmental assessments. The expertise that's available to the U.S. either from their own staff, from the pool of scientists and engineers with polar experience, or from other sources to assist in the development of these various plans and inventories—and I hate to use the word "regulations" because it's been used here too much today—and assessments to assist in the development of those. No other Federal agency has the ability to tap the available Antarctic and polar expertise as quickly or with as proven a record of previous positive interaction.

The research community is deeply concerned about the impact of legislation such as this on the conduct of science in Antarctica. This is not to imply that there is no environmental sensitivity for those of us who have or will work in Antarctica. Most of us consider ourselves environmentalists. We work in the environment. We take our cues from the environment, and we appreciate the natural environment. However, most of us are also pragmatists, and we realize that in order to do our research, we are going to have an impact on the environment. I am concerned that the strict application of standards developed for use in the United States and possible further restriction on human activity of all forms in the Antarctic may be such that it will be so difficult and expensive to conduct research that the easy way out will be simply not to do research at all.

Now, the issue of tourism has recently become one of more popular discussion, and it is my view it is important to differentiate the various kinds of tourism activities that take place in the Antarctic. Some of them, the large commercial visits, might be very easy to regulate—at least to keep track of—while there are many, many smaller private visits that occur on an annual basis in sailboats, in

whale boats, in whatever. Dog teams and all other sorts of things. I speak to the issue of tourism as a result of my one trip as a lecturer aboard a cruise ship this past January. Prior to that time, my experience in the Antarctic was spent in the interior, where there were no such things as tourists, and most of them didn't care where we were.

But what I think is important is that the commercial group based here in the United States, as Dr. Wilkniss has indicated, have voluntarily adopted measures for the protection of the environment. I think it's clear that the same kinds of regulations and practices have not been adopted by some of the smaller groups simply because they don't have the capability to carry out the reasonable environmental practices.

I'm well aware of the fact that visits by commercial groups to the scientific stations of various countries have caused concern among the scientific community, and whereas several years ago I would have argued that tourists should not visit stations, I am now convinced that their visits are a valuable public relations tool, potentially, for the National Science Foundation and that the necessary accommodations should be made to allow such visits. In the long run, such visits would have a positive effect on scientific activities if they are used to educate the participants about the scientific work in progress, if they are used to educate the participants about the environment and of the value of the research to mankind. And I would urge the NSF, through this legislation, to develop a positive action plan with minimal rules and regulations that would allow science and tourism to co-exist in the Antarctic.

If this legislation is adopted, the NSF will have the opportunity to develop and implement an environmental plan that will meet the standards expected, and I suspect that that will include the protocol and the various annexes to that protocol.¹ I was a participant in the initial stages at Vina del Mar as a member of the U.S. delegation in November, and we have seen those develop. And I assure you that the U.S. provided the leadership in writing each one of those annexes that are part of the protocol.

I hope that this legislation will provide an opportunity to show the NSF that they—for the NSF to show that they have the ability and interest to develop such plans and to move forward. I sincerely hope that all of the people involved will allow those plans to be developed with an application of common sense and with an eye toward the principle of the rule of reason so that such things in the Antarctic will allow the continuation of the excellent scientific programs that currently exist. And I fully support this legislation and hope that you will move it forward, because the U.S. has been and other countries in the Antarctic have been marked by their implementation of constraints far earlier than that that would come from formal adoption of those rules. And I suggest to you that the delay that might be caused by waiting for the approval of the protocol by the meeting in Madrid and then all of the various approvals that would follow simply is not an excuse for not moving this bill forward.

¹This reference is to a proposed environmental protocol to the Antarctic Treaty.

Thank you.

[The prepared statement of Dr. Rutford follows:]

STATEMENT OF ROBERT H. RUTFORD
to the
HOUSE SUBCOMMITTEE on SCIENCE
of the
COMMITTEE on SCIENCE, SPACE, and TECHNOLOGY
concerning the
NATIONAL SCIENCE FOUNDATION
ANTARCTIC ENVIRONMENTAL PROTECTION ACT OF 1991

May 14, 1991

It is my pleasure to be here to testify on this proposed legislation, entitled the "National Science Foundation Antarctic Environmental Protection Act of 1991." Legislation such as this is too often considered without the opportunity for testimony from the scientists involved in the conduct of Antarctic research and in the development of research plans for that continent and surrounding seas. (Parenthetically, I might note that too often the testimony heard by Committees of the Congress comes from Washington based interest groups while the members of the scientific community, scattered across the nation in a multitude of academic institutions, are unable to come to Washington to present their views in person because of a lack of travel funds. Somehow the Congress needs to insure that the playing field for those with differing views is a level one.)

The United States Antarctic Program is recognized as the premier research program in Antarctica. Since its inception during the International Geophysical Year in the mid 1950's, the program has made major contributions to the understanding of this southern continent. Biology, geology, geophysics, glaciology, human medicine, upper atmospheric physics, space sciences and other disciplines have been a part of this research activity and thousands of scientific papers dealing with this research have

been published. The U.S. can be proud of the accomplishments of this program, and it is essential that the scientific work continue with a minimum of constraints on the various research programs.

When the U.S. Program began during the International Geophysical Year, there was no notion that the research initiated at that time would continue. However, following the completion of the IGY, the decision was made to continue research activities on the Antarctic Continent. The stations that had been constructed with a single year's operation in mind now became home to continuing programs that would undergo considerable growth in the ensuing years. Additional stations were constructed, some were abandoned, but the end result was a U.S. program that was active and vital, a trend that continues to this day.

During the 35 years since the inception of the program the United States has had a continuous presence in Antarctica. Twenty-four other nations conduct research in the Antarctic. These research activities are an intrusion into an environment that has no indigenous human population. It must be understood that any intrusion into what some have called a "fragile" environment but which is actually a "plastic" environment will impact that environment. As a field geologist I have had the fantastic opportunity to work in areas where no other human has ever

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walked. I assure you that it is a humbling experience. It makes one aware that the conduct of science in such an environment must of necessity be one of certain trade-offs. To do science one must intrude; the secret is to make that intrusion minimal. To not intrude means that there will be no scientific research carried out, to do research without sensitivity to the environmental issues is to intrude unnecessarily.

As environmental awareness has increased here in the U.S., so too has it increased in the Antarctic. U.S. laws concerning environmental protection have been developed and are now being applied in the Antarctic. The majority of these laws do not take into consideration the problems associated with their application in an area such as Antarctica. The strict application of these laws is probably not possible without having a major impact on the ability to conduct research. It is not a matter of conducting research with no regard for the environment, but rather that the implementation of the requirements would have had a major impact on the funding available for research. Given a limited budget the decision was to do research and to make the necessary environmental improvements as funds became available. Some might, and have argued that this was not what should have been done, but given the minimal scale of the environmental problems, it was, I believe, the prudent decision. Considerable progress has been made in the cleanup, mitigation, and prevention

of environmental damage. To suggest that there were no mistakes made is to ignore the facts; things were done in the past that are not done today.

A careful look at the proposals for some of the environmental improvements in Antarctica leads to the conclusion that some of them are fine for the temperate regions but make no sense in the Antarctic. For example, the matter of landfills. While a landfill in the U.S. may have leaching problems, in an area of permafrost leachate liquids have minimal impact, yet environmental groups continue to identify landfills as an issue at McMurdo Station. We give long and serious thought to the disposal of human wastes at coastal stations, yet the amount of waste added to the waters is very small when compared with that poured into the sea by the natural inhabitants, the penguins and seals.

This proposed legislation places the responsibility and authority for environmental issues in Antarctica squarely on the shoulders of the Director of the National Science Foundation where it should be. As the agency responsible for the U.S. Antarctic Program, it seems quite appropriate that the NSF should be tasked with the development of standards, environmental protection measures including a solid waste and hazardous management plan, environmental audit, environmental monitoring, and environmental

assessments. The expertise necessary is readily available to the NSF either from their own staff, from the pool of scientists and engineers with polar experience, or from other sources to assist in the development of the various regulations, plans, inventories, audits, inspections, monitoring programs, and assessments called for in this proposed legislation. No other federal agency has the ability to tap this available Antarctic and polar expertise as quickly and with a proven record of previous interaction. Groups such as the Polar Research Board of the NRC are also available to assist.

The research community is deeply concerned about the impact of legislation such as this on the conduct of science in Antarctica.

This is not to imply that there is no environmental sensitivity among those of us who have or will work in Antarctica.

Unfortunately, the term "environmentalist" has taken on a new meaning in recent years. I consider myself an environmentalist; after all, as a scientist I am trained to identify environmental cues, and as an individual I appreciate the natural surroundings where I do my work. However, I am also a pragmatist. I am concerned that the strict application of standards developed for use in the continental U.S. and possible further restrictions on human activity in the Antarctic may be such that it will be so difficult and expensive to conduct research that the easy way out

will be to simply not do research at all.

The issue of tourism has become one of popular discussion. In my view it is important to differentiate between the large scale commercial tourist visits to the Antarctic and the many smaller private visits. I speak to this issue with limited experience, as I have participated as a lecturer on only one tour-ship visit to Antarctica, but I can assure you that many of the commercial groups have voluntarily adopted measures for the protection of the environment. I cannot say the same for many of the private "adventurer" groups who simply do not have the resources available to them to carry out reasonable environmental practices. I am well aware of the fact that the visits by the commercial groups to scientific stations of the various countries have caused concern among the scientific community. Whereas several years ago I would have argued that tourists should not visit stations, I am now convinced that their visits are a valuable public relations tool, that the necessary accommodations should be made to allow such visits. In the long run tourist visits will have a positive effect on science activities if they are used to educate the participants about the environment, the scientific work in progress, and the value of such research to mankind. I urge the NSF to develop a positive action plan that will allow science and tourism to co-exist if not complement each other.

If this legislation is adopted, the National Science Foundation will have the opportunity to develop and implement an environmental plan that will meet the standards expected and that will not eliminate the opportunity for meaningful and valuable research in Antarctica. This legislation provides an opportunity for the NSF to show that they have both the ability and interest to develop such plans and programs. I sincerely hope that those plans will be developed with lots of common sense and with an eye toward the principle of the rule of reason. I urge you to pass this legislation as soon as possible.

Mr. BOUCHER. Thank you, Dr. Rutford.
Mr. Craig, would you care to go next?

**STATEMENT OF ROBERT CRAIG, PRESIDENT, THE KEYSTONE
CENTER, KEYSTONE, COLORADO**

Mr. CRAIG. Thank you, Mr. Chairman.

I would like to commend Chairman Boucher, members of the Subcommittee on Science, and the subcommittee staff for their thoughtful development of the Antarctic Environment Act of 1991.

My principal concerns regarding the act involve four areas: the environmental provisions of the act; conduct of scientific activities under the act; safety; and tourism. I believe the act provides reasonable and achievable environmental rules, safeguards, and standards that have needed clarification and codification for the U.S. personnel to operate within appropriate concern for the environment and to ensure their own safety as well. Further, I believe they establish a base line of standards that must be taken seriously and implemented by other nations of the Antarctic Treaty system.

I would echo also Dr. Rutford's concerns that the strict involvement of certain aspects of national environmental law, some standards found within NEPA, must be looked at in terms of that environment. If you haven't seen Antarctica or been in that environment, and particularly I would say under more extreme conditions that one encounters inland, where Dr. Rutford has done a lot of his work, you realize that environmental compliance gets very difficult.

From my experience and perception, the conduct of science in Antarctica is the activity which, pursued within the boundaries of sound environmental policy, offers the opportunity not only for international exchange and understanding, science being what it is, but the framework for preservation and protection of the priceless resource that is Antarctica. The act establishes a framework for the conduct of base and field operations that can only help to strengthen the justification of scientific inquiry in the Antarctic region.

As a member of the U.S. Antarctic safety panel, which made strong recommendations to the National Science Foundation concerning safety to U.S. personnel in Antarctica and which has linked safety practices and operational rules to sound environmental policy, I would like to urge mention of the role safety, environment, and health offers in the conduct and enforcement of the Antarctic Environment Act. If not a specific mention of these things, I would hope the act would acknowledge that NSF has in place a mechanism which will be of great value in the fulfillment of goals of this legislation.

With regard to tourism in Antarctica, I would submit that international tourism will affect Antarctic life, and to deny its reality is to miss an opportunity for the broadest and most effective international environmental regime for the continent. I believe a quota system to maintain balance in environmental impact is desirable. I don't know what that quota level should be, but I'm sure that it can be worked out between the appropriate parties. I would recommend the implementation of voluntary procedures on tourism of

the Antarctic tourist code and that these implementation procedures be worked out between the National Science Foundation and tourism operators.

I would like to read for the record what the Antarctic travelers code really involves, because I think it needs stating. Inasmuch as my colleague and friend, Ron Levine, is not here to make this presentation, I will read this for the record.

"The Antarctic travelers code. Antarctic visitors must not leave footprints in fragile mosses, lichens, or grasses; must not dump plastic or other non-biodegradable garbage overboard or into the continent; must not violate the seals', penguins', or sea birds' personal space, starting with a base line of 15 feet, 5 meters from penguins, seabirds, true seals, and 60 feet, 18 meters from fur seals; give the animals the right-of-way, stay on the edge of and don't walk through animal groups, back off if necessary; never touch the animals; must not interfere with protected areas for scientific research; must not take souvenirs. Antarctic tour companies should apply the Antarctic travelers code to all officers, crew, and staff and passengers; should utilize one guide or leader for every 20 passengers; should employ experience and sensitive on board leadership; should use vessels that are safe for Antarctic ice conditions; should adopt a worldwide anti-dumping pledge.

Tourism, properly conducted, can compliment many of the goals of science, of U.S. presence, which in itself can be a force for Antarctic preservation, and of the strengthening and advancement of the goals and mission of the Antarctic Treaty system. I recommend that the committee consider—I recommend that NSF explore the development of demonstration tourist sites which would fulfill the outlines that were suggested above. The tourist code as well should provide exhibits—I'm sorry—the tourist approach would as well provide exhibits and displays and printed materials concerning the range of scientific activities as well as explicating the range of cooperation, sharing of information and interdependence in matters of safety, meteorology, hydrology, et cetera, of the treaty nations. It may be that existing sites could be utilized in this regard—for example, the old Palmer Base site—but it is clear that since time is of the essence in Antarctic research, some separation of working scientists from the tourist public must be achieved.

As the former President of the American Alpine Club and one involved in mountain exploration all over the high mountains of the world over the past 50 years, I would like also to add that the mountaineers of all the countries in the world who have climbers view Antarctica as a region where exploration and climbing should be allowed to continue. They recognize, however, that previous environmental practices, or lack thereof, cannot be condoned in Antarctica.

I would like to recommend in the same respect as the tourist operators that NSF, working with the American Alpine Club, the Explorers Club, and the Antarctic Society, develop stringent guidelines for the conduct of mountaineering operations on the continent. I believe there is a new spirit afoot amongst climbers that will yield positive action toward environmental preservation and protection in Antarctica. The great Italian climber, Reinhold Messner, has described this new spirit in his concept of "white wil-

derness," which equates to "leave the land exactly as you found it."

I would like to finally caution against overdistribution of regulatory oversight and enforcement amongst several agencies in Antarctica. I believe NSF can do the job if given clear mandates. Antarctic bases are like ships. They have limited spaces for administration, and proliferation of agencies involved in achieving national environmental goals in Antarctica could be very counterproductive. Perhaps what is needed is an interagency involvement to be overseen by the NSF administration function.

Some of these other responsibilities are outlined and stated in the new H.R. 2051, which I have just received and haven't had a chance to read, but I will do so, and I think that the only question I have is that one should not be spreading responsibilities in Antarctica to the extent that the bureaucracy at the various bases would increase and thereby create further potential environmental impacts. I have heard that there is some sentiment within NSF to contract out some of the responsibilities that have previously been undertaken by the United States Navy and Coast Guard, and I have real concerns about this trend.

Thank you, Mr. Chairman.

Mr. BOUCHER. Thank you very much, Mr. Craig.

Dr. Sullivan, we'll be happy to hear from you.

STATEMENT OF CORNELIUS W. SULLIVAN, DIRECTOR, HANCOCK INSTITUTE FOR MARINE SCIENCES, UNIVERSITY OF SOUTHERN CALIFORNIA, LOS ANGELES, CALIFORNIA

Dr. SULLIVAN. Thank you very much, Mr. Chairman, for the opportunity to come and comment on the National Science Foundation's Antarctic Environmental Protection Act of 1991.

In reading that, I note with great pleasure in section 2, under "Findings," that the essential role that the Antarctic plays in regulating the global climate, the ocean, and the atmosphere is both recognized and appreciated by the Congress. It's clear that the Congress also recognizes the National Science Foundation's improved environmental practices at United States Antarctic Program stations and field camps in Antarctica. I think this latter point is important because it indicates that some cures for some of the previously recognized environmental problems are already well in hand, while other problems are being prevented as a result of more environmentally sound practices, and I've seen that over the years that I've been working in the Antarctic on a first-hand basis.

I've conducted biological oceanographic research in both of the polar regions for approximately the last 15 years, during which time I've led five studies in the Arctic and 13 in the Antarctic. In the Antarctic, my research work with my students and post-docs was conducted at land-based facilities such as McMurdo Station, as well as on board ships and ice-breakers in the oceans and in the pack ice surrounding the Antarctic continent. But in addition to first-hand knowledge from my own experience, I've worked closely with interdisciplinary studies with many of my American colleagues and foreign colleagues who share a deep love and an awe of the natural beauty that's characteristic of the Antarctic.

A role not mentioned in the legislation nor the discussion up until now, and there are very few, since I'm the last speaker—it seems like everybody has hit on all the high points that I wanted to talk about—but one that wasn't mentioned is the importance of the Antarctic as a site for training bright, young scientists at various stages of their professional development.

During the last decade of research in Antarctica, I've had approximately 10 graduate students working in Antarctica toward advanced degrees—Masters and Ph.D. degrees—five post-doctoral scholars furthering their studies, and recently I've had the pleasure of having the first young woman recipient of the NSF Young Scholars Program, a high school student from Saratoga, California, in my research team at McMurdo Station. These people are just a very few examples of the many dedicated and talented young scientists who gain what I think is an unparalleled education in the natural sciences by working in Antarctica in the field and planning that work for years or months and executing it by going to Antarctica and spending two or three years following that working up the data and publishing it in reviewed journals. These individuals are the future scientists which we wish to encourage to pursue careers that help to solve some of our most pressing environmental problems, and it's my hope that we do not burden these individuals with excessive—I'll use the "R" word—regulations that might discourage their entry into studies of this geographically important region of the oceans and the earth.

We all know that the Antarctic is an unforgiving environment, though it may be beautiful—and it is—and that the work there requires great personal sacrifice and logistic commitments and unusual expenditures of time. I think certain legislation that is being considered may add substantially to the already heavy burden that I've just mentioned even more regulations, applications, special permits, and training programs and other restrictions that basically increase the overhead that a young scientist must pay in order to pursue a career in polar research. And I had the feeling that that might sound trivial to some people, but if you recognize what a young scientist does in order to graduate from an undergraduate institution and then get a scholarship to go to the university and finish four years and maybe five years with a Ph.D. and then get a post-doc for two years, in order to start a career that might pay \$30,000 or \$35,000 for them to start at that time, you have to recognize that time is of the essence, and their work has to be very efficient.

Now, I think our opportunities for maintaining a dominant leadership role in polar science shrinks as we lose these talented people, and I think it's apparent that as a nation, we cannot afford such a loss because, as we all know, the polar regions are great sources of natural resources—living resources, mineral resources. And when you consider both polar regions—the major staging areas for our offensive and defensive postures—these are very important people who have a first-hand knowledge of this environment.

I believe that it's crucial to protect the Antarctic environment at the same time, because we scientists—and I might say particularly biologists, but everyone—need to study a relatively unchanged en-

vironment. There's no sense going down and studying what you've done to the environment, so we want to keep it as pristine as possible. And I think we simply need to exercise prudence and good judgment in drafting good legislation that will not close this region to legitimate scientific endeavors through some legislation that may be overly ambitious or restrictive, and particularly I'm concerned about stringent enforcement. If there are attitudes in the Nation that have a great voice that feel that emitting water and carbon dioxide into the environment is serious and can't be tolerated, I would worry that such people would have a voice in enforcement.

A particular concern is seen in section 4, "Environmental Standards", where we have across-the-board application of U.S. environmental law being proposed to be applied in Antarctica. Frankly, I'd like to see that section removed from the legislation. I think the United States and Antarctica are simply two strikingly different environments with very different problems, and very likely different solutions are necessary to solve those problems. I'm particularly concerned that aggressive implementation of the plethora of environmental laws, most of which I don't know—I know there are a lot out there; I hear about them every night on the evening news or on the television—but if they are all being addressed on problems that are extant in the United States, when they're applied to the Antarctic, it seems it would produce far more harm than good, and I think there is little evidence to suggest that all U.S. environmental regulations have relevance in Antarctica.

The last comment that I'd like to make is that there is another impact this legislation may have upon scientific studies in Antarctica, and that's the burden it may place on facilities and financial resources. Dr. Rutford spoke about several of those. I'll just mention one, and that is at McMurdo Station, one of the provisions says that the new facility, if used to house "appropriate laboratory space, personnel, and other resources within the laboratory to environmental monitoring, assessment, compliance, investigation, and enforcement activity"—I would think if that laboratory is used for that, it will certainly have a direct and an adverse influence on the conduct of basic research. The reason for that is that this measure would remove some of the very precious and well-planned space in the new science facility, which was designated and designed largely for basic research by grantees, to other purposes. And there are certainly a lot of other buildings that still exist there—actually, other laboratories—that might be used for regulation.

I think that this potentially world class laboratory facility should be used by the U.S. and by foreign scientists to foster the best environmental research consistent with the spirit of the Antarctic Treaty by working with an international facility and sharing this facility with people from other countries. But in any case, it's not obvious to me why the use of the science facility by regulatory people should be legislated rather than leaving that decision to the discretion of the Director of the Science Foundation, but, then, I'm a scientist and not a legislator, so take it with that in mind.

I think I'd like to close right there and thank you for the opportunity to speak to you.

[The prepared statement of Dr. Sullivan follows:]

U.S.HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE AND TECHNOLOGY
SUBCOMMITTEE ON SCIENCE

HEARING ON NATIONAL SCIENCE FOUNDATION
ANTARCTIC ENVIRONMENTAL PROTECTION ACT OF 1991

May 14, 1991

Dr. Cornelius W. Sullivan, Director
Hancock Institute of Marine Studies
University of Southern California
Los Angeles, California

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Thank you very much Mr. Chairman for the opportunity to comment on the National Science Foundation Antarctic Environmental Protection Act of 1991 by appearing as a witness at the hearing held by the Subcommittee on Science of the U.S. House of Representative Committee on Science, Space and Technology. I believe that this is a very important hearing. It concerns legislation that may have a profound impact on the ability of American scientists to conduct important research on issues of global concern in the great natural laboratory of Antarctica and in its surrounding seas.

I have conducted biological oceanographic research in the polar regions for the past fifteen years, during which time I have led five studies in the Arctic and thirteen in the Antarctic. In the Antarctic my work was conducted at land based facilities such as McMurdo Station as well as on board ships and icebreakers in the oceans and pack ice surrounding the continent. But in addition to first hand knowledge from my own experience, I have worked closely, on interdisciplinary studies, with many of my American and foreign colleagues who share a deep love and awe of the natural beauty characteristic of the Antarctic region. We wish to preserve this remarkable continent while continuing to carry out scientific investigations. These two goals are fully compatible.

I note with great pleasure in Section 2. FINDINGS that the essential role the Antarctic plays in regulating global climate, ocean and atmosphere is both recognized and appreciated by the Congress.

It is clear that the Congress also recognizes the National Science Foundations' improved environmental practices at United States Antarctic Program stations and field camps in Antarctica. This latter point is important because it indicates that cures for some previously recognized environmental problems are already well in hand while other problems are being prevented as a result of more environmentally sound practices. During my career in Antarctic research, I have observed first hand substantial improvements in pollution control and remediation on the part of both civilian and military participants in the U.S. Antarctic Research Program.

A role not mentioned in the legislation under consideration is the importance of the Antarctic as a site for training bright young scientists at various stages of their professional development. During the last decade of research in Antarctica, I have had approximately 10 graduate students working in Antarctica towards advanced degrees, 5 postdoctoral scholars furthering their studies and recently have had the first woman recipient of the NSF young (high school) scholars program in my field research team at McMurdo Station. They are but a few examples of the many dedicated and talented young scientists who gain an unparalleled education in the natural sciences by working in Antarctica. These individuals are the future scientists we wish to encourage to pursue careers that help to solve some of our most pressing environmental problems. It is my sincere hope that we do not burden these individuals with unnecessary and excessive regulations least we discourage their entry into studies of a geographically important region of the oceans and earth. We already

know that the Antarctic is an unforgiving environment and that to work there requires personal sacrifice, great logistic commitments and unusual expenditures of time. Yet certain legislation being consider may add substantially to their already heavy burden even more regulations, applications for special permits, training programs and other restrictions that increase the overhead a young scientist must pay in order to pursue a career in polar research. Our opportunities for maintaining a dominant leadership role in polar science shrinks as we lose this talent. It is apparent that as a nation we cannot afford such a loss.

I believe that it is crucial to protect the Antarctic environment. Most scientists need and desire to study the relatively unchanged Antarctic environment and Antarctic biota uninfluenced by man. We can continue to do this by exercising prudence and good judgement in drafting good legislation that will not close the region to legitimate scientific endeavors through overly ambitious and restrictive laws and stringent enforcement. I commend the Chairman on most of the legislation we consider here, however I do have some concerns. One in particular is noted in SEC.4 ENVIRONMENTAL STANDARDS (b)(2) where across the board application of U.S. environmental law apparently is proposed to be applied in Antarctica. I suggest removing this section of the proposed legislation entirely, *if it is interpreted as all U.S. environmental law*. The United States and Antarctica simply are two strikingly different environments with different problems and quite likely there are very different solutions necessary to resolve them. I am most concerned that aggressive

implementation of the plethora of environmental laws designed to address specific problems extant in the United States, when applied to the Antarctic, would produce far more harm than good. In particular it could close Antarctica to much of the research that currently is conducted there. In addition, there is little evidence to suggest that *all* U.S. environmental regulations have relevance in the Antarctic.

An other impact this legislation may have upon scientific studies in Antarctica is the burden it places on facilities and financial resources. A prime example is indicated in Sec.11(h) concerning science facilities. The new science facility in McMurdo Station, if used to house "appropriate laboratory space, personnel, and other resources within the laboratory to environmental monitoring, assessment, compliance, investigation, and enforcement activity" as stated on page 18, lines 10 - 13 , certainly will have a direct and adverse influence on the conduct of basic research in the Antarctic. Such a measure will remove from use precious laboratory space in the new facility which was planned and designed largely for basic research by grantees. This potentially world-class science facility will be diminished by such use. Rather we should encourage use of the science laboratory by the best researchers from the U.S. and other countries in a spirit consistent with the Antarctic Treaty. In any case, it is not obvious to me why uses of the science facility including " environmental monitoring, assessment, compliance and enforcement activity" should be legislated rather than be left to the discretion of the Director.

In closing, I would argue that moderation and careful thought being given to any new legislation so that it specifically addresses environmental problems that exist in Antarctica and is consistent with special safety considerations of the Antarctic environment. By contrast broad application of all U.S. environmental regulations is likely to have a substantially negative impact on the ability of American scientists to solve globally important scientific problems and to remain competitive in the international arena of science in Antarctica. It is my personal opinion that provided proper guidance and appropriate resources the National Science Foundation is the most appropriate Federal Agency to maintain responsibility for environmental monitoring, pollution control and control of tourism related to U.S. activities in Antarctica.

Mr. BOUCHER. Thank you, Dr. Sullivan, and we extend thanks to all of the witnesses for their comments here this morning.

One of the proposals that has been kicked around somewhat in the international community is that as a way to minimize environmental impact, there would be a coordination of research projects to make sure, first of all, that there's no duplication, and secondly, to make sure that the proposed projects really do have some value and that you don't have unwarranted activities in effect taking place in the Antarctic. Could you comment, based on the experience that all three of you have had, about the value of that proposal and the gravity with which it is taken in the scientific community internationally?

Dr. Sullivan?

Dr. SULLIVAN. I would like to comment on that proposal, Mr. Chairman, with just one caution: I think it's very important not to duplicate research, but you have to recognize that once somebody makes an initial observation and describes it, it's necessary to confirm that observation, so in that sense there's always a duplication of good research, and it needs to be confirmed.

But with that exception, I think the whole spirit of the scientific community now is emphasizing multi-disciplinary and interdisciplinary research, and in the Antarctic I don't think I've ever seen any examples that are better because, in addition to being multi-disciplinary, it's also often multi-national. And Dr. Wilkniss mentioned a program that's coming up that I'll be participating on. It's the U.S.-Soviet drifting ice station. There are participants that include, obviously, the U.S. and Soviets, but also British, German, and other nations that are associated with that program, and it's the best way to do science, so I fully support it.

Mr. BOUCHER. All right.

Dr. Rutford?

Dr. RUTFORD. If I might comment, I think that the international—well, the Antarctic Programs began as international programs. They began in the International Geophysical Year. They have carried a very strong international component since then. There is an organization, the Scientific Committee on Antarctic Research, which is an ICSU organization, which each country has a member that comes from the national committee. And we meet every other year in the off year from the Antarctic Treaty to talk about the coordination of research and research activities in the Antarctic.

There are working groups and groups of specialists associated with that organization that meet when they can, and I think the thing that is the most meaningful development is the fact that not only are the research plans being coordinated, but I think we will see in the future increased use of single stations by more than one nation. We see that now with the Polish station, Arkowski, on King George Island, with the Netherlands leasing part of that station for conduct of their research, and I think we'll see an increase in that. If we can just not let the logistics get any larger, keep it contained where it is now and still be able to conduct and increase the amount of research, I think it will be a great step forward.

Mr. BOUCHER. Well, let me get your thoughts on a proposal that goes even one step further, and that is that there be an international panel created to review every proposed research project in

the Antarctic, with the apparent goal of not allowing that project to go forward unless it receives approval. Is that a good idea?

Dr. RUTFORD. I don't know who God is. I don't know who is going to sit on that panel and review the research activities. That particular proposal came as part of the proposal made by the group of five at Vina del Mar, and I think that it in general was received with very limited enthusiasm by the scientific community.

Mr. BOUCHER. Do you share that limited enthusiasm?

Dr. RUTFORD. Yes. We here in the U.S. have a process called peer review in which our peers review us, and, you know, it's a pretty tough operation. Can you imagine going through that process here in the U.S. and then having your piece of proposal for research to go to somebody someplace— Geneva or wherever they would meet—and have it reviewed again and say, "This is not good research"? Who would serve on that? I have no idea who would serve on that panel. I'll take my chances with my peers, and I think the notion of some international body like that is just ludicrous at best.

Mr. BOUCHER. Dr. Sullivan, do you sort of briefly agree or disagree?

Dr. SULLIVAN. Very briefly, I completely agree with what Dr. Rutford said. It's a very bad idea, and when we're asked to sit on a panel in the United States at NSF to review 100 proposals of our colleagues, which we do as a service, I find that it takes about two months of my time to do a good job. I wouldn't want to see the world's proposals on my doorstep at any time.

Mr. BOUCHER. Mr. Craig?

Mr. CRAIG. I'd just like to say that lately we've been working in the area of plant genetic resources in the international field—in the international jurisdiction, I might say, although it's not clear what the jurisdiction is— and I have been appalled by the kind of bureaucracy that exists out there and that has gone on these past 40 years, partly because of the east-west divisions, which really prevent good science getting done and good exchange of information, and I would therefore echo the sentiments of Dr. Sullivan and Dr. Rutford that this kind of peer review does the job, and I would submit also I think the Russians, the British, the French, Australians, and New Zealanders would agree with this—that is, the scientists would.

Mr. BOUCHER. That's a strong and unanimous view. I'm only going to ask one additional question and then yield to my colleagues. I think this is a particularly well-qualified panel, perhaps as well-qualified a panel as we could find anywhere in the United States to comment on this core issue, and that is to what real extent would the application of all of the environmental laws in the United States designed for control of activities here in this country, if applied to activities in the Antarctic, seriously jeopardize the ability to conduct scientific research in the Antarctic?

Now, Dr. Rutford, you did comment on that initially, but I think it might be useful for you to expound to some extent on the reasons you see problems.

Dr. RUTFORD. Well, it's not a simple—there's not a simple answer to your question, so let me simply take you to McMurdo Station, which is the largest U.S. staging base in Antarctica, and then build a sewage treatment plant that will at least provide primary, and if

you apply the strict laws, you'd be up to a secondary, tertiary sewage treatment plant in Antarctica at McMurdo Station. The cost, the number of people that you'd have to bring in to build a station, the number of ships it would take to provide the material—given the limited resources that are available, science is going to suffer. There is just—I mean, nobody can argue the other way unless the resources are pumped up and made available to do something like that.

Okay. I go to Antarctica, and I work all my life on the interior. We fly in with the C-130, and we set up a tent, and we sometimes set up more than one tent or set up Jamesway huts, and we're there for two or three months. Human wastes in a tent camp—when I'm in a tent camp moving with a motor toboggan 300 or 400 miles during the course of a season, what do I do with this stuff? I'm 1,500 miles from McMurdo. That kind of research under strict application could not take place. The Ellsworth Mountains, which contain the highest peak in Antarctica, would not have been—the geology would be unknown if those standards had been applied.

So, I mean, I don't think any of us would argue that at the big bases, you know, that things need to be done. The question is how far down the pike are we going to go? Bruce and Jim and the others and I have argued about this for, I don't know, umpteen years now, and I'm not convinced. Dr. Wilkniss talked about the 20,000 miles of coastline of Antarctica, and on that 20,000 miles of coastline, you can probably—you know, there are little, tiny pin pricks where there has been environmental degradation, and the rest of it is still pretty much pristine, if that's the proper word, and that may be part of the tradeoff to do science. I don't know.

Mr. BOUCHER. Dr. Sullivan, I'd like to get your comment as well, and before asking the question, let me say that you had pointed to section 4 of our bill, which does, in a general sense, require that there be a level of environmental protection in Antarctica which is roughly equivalent to the level that is provided here in the U.S. We do not specifically in this bill apply the U.S. environmental laws to operations in Antarctica, and we even provide a general condition that the application be consistent with special safety considerations and operational requirements that exist in Antarctica because of its climate and other conditions.

But let me get you to respond to that same general question. What kinds of specific problems would you see being created for scientific research if the U.S. environmental laws were precisely applied in Antarctica?

Dr. SULLIVAN. I think in order to answer that question adequately I would have to know all of the environmental laws in the United States, and I simply don't know them. And I think we've had a few examples of some cases—I know we have people who are working with instruments. Other than the person physically being there and the support to feed that person and house that person, their scientific activities do nothing more perhaps than measure the amount of light. So their work certainly is not having any impact. Their science per se. Their instruments put out, and it's coupled to a computer, and it comes back.

Other people may go and—I would think one of the extremes might be using radioactive material—that is, tritium and C-14—to

do rate process studies of organisms, determining how fast microorganisms are growing. They use those radio chemicals in containers. They do it in a fashion that's consistent with all of radiation safety law in the United States. They have to be licensed through their university and so forth to do that kind of work, and I know that that's a very emotional issue with people because I do that kind of work. It's emotional with the public. We work with compounds that are sent through the U.S. mails because the vendors who sell us those compounds ship them under proper regulations.²

So it seems to me that there is such a wide variety of science that is done, and if a reasonable approach is taken toward implementing regulations that fit the environment and the situation, I have no difficulty with it. As I said, it's not clear to me how the law will be implemented, and it's just a difficulty.

Mr. BOUCHER. Thank you, sir.

Mr. Craig?

Mr. CRAIG. I have not really anything to add to that. I agree with both of the other gentlemen about the problems that are involved, but it seems to me that there is a limit beyond which one can carry back or remediate certain impacts on the environment, especially out in the heart of the continent, but I think a good deal of material can be brought back, and, of course, it also requires, in some cases, being very prudent about what you take in outside of the necessary instrumentation. Also, the packaging of food stuffs and so on, things of that sort, can, I think, be approached in a more creative manner than has been thus far. We've been very particularly concerned with disposable of plastics at sea for the U.S. Navy, and we're finding now that plastics can be avoided in many cases and still have the quality of food and other items that are needed by more creative packaging.

Mr. BOUCHER. Thank you very much.

The gentleman from California?

Mr. PACKARD. Thank you, Mr. Chairman.

I've not been to the Antarctic—sometime I would like to—but I'm having a difficult time in my own mind getting a picture of the scope of the problem. Testimony earlier indicated approximately 4,000 tourists a year. I have to assume that they're not there year-round. Those are 4,000 people that go for maybe a week or less or more and leave, and if 4,000 people visit Antarctica a year, that doesn't create nearly as much impact as what this hearing would lead us to believe.

Interior, Dr. Rutford, how many people—testimony earlier indicated the concern was not with the scientists doing the research, it's with the support that it takes to provide for the research. How many people normally would be in the interior of Antarctica doing research work in a given time?

Dr. RUTFORD. Well, given the available aircraft, you probably have interior field camps of 35 to 40 people, supplied by LC-130 aircraft, either doing the west Antarctic ice sheet or geology in the Elsworth Mountains. You'd have at the South Pole Station approximately 20 to 25 year-round residents with peak residency in the

²Dr. Sullivan indicated that such research is closely regulated and monitored by university radiation safety officers and in Antarctica by the NSF and its prime contractor, ASA.

summertime of maybe 100. McMurdo Station peak residency probably 1,000 or thereabouts — maybe that's a little high; maybe 800 at maximum—but year-round about 60 people.

So the problem—the tourists come and go, and I think that, you know, at least the U.S.-based cruise ships are very careful about, you know, the bilges and all that. The problem is not—the magnitude of the problem is not great, the problem is it's confined to relatively small spaces. I mean, if you spread that out all over the continent, you couldn't even find it, but you've got the problem of cruise ships concentrating in the Antarctic Peninsula, the major logistics effort for the U.S. being concentrated at McMurdo Station and supplying both the previous station that operated and South Pole Station out of McMurdo, so you have a lot of material funneling in and people funneling in and then spreading out.

So the notion that there is no visible environmental impact at McMurdo Station—I mean, you'd have to be blind and couldn't feel to argue that. It's there, and it's a problem. But, as I say, that might be the tradeoff for the other positive things that come out of the program.

Mr. PACKARD. Well, none of us want to be insensitive to those environmental concerns, and that's the very purpose of the legislation. That's the purpose of the work that's being done in the international community, but we have pristine areas in this country. We have wilderness areas in this country that are not inhabited by a lot of people, but a lot of people go through in many instances.

In the wilderness area of California, for example, we'll have 50, 100, 1,000 times more people go through a pristine area than we've referred to here, and they have human waste, they have other needs to support those groups that go through. In my own area of San Diego County, there is between a million and two million gallons of raw sewage flowing to the ocean every day at different times. Every day through the Tiajuana River, flowing out of Mexico from a million and a half people that live in Tiajuana, into the United States, and on out without any treatment whatsoever. And we don't have near the environmental outcry, even though it is a very significant environmental problem to us, and we're striving to do something about it. But we don't have near the outcry that we do in a pristine area like the Antarctic. So I'm trying to get it all in perspective.

Let me ask one question, Mr. Chairman, maybe two, and then I'll conclude, because we've held this hearing long enough.

In your testimony, Dr. Sullivan, you very eloquently expressed a desire to inspire young students into science. We've held subcommittee hearings in trying to evaluate how we can better do just that: inspire young students into scientific careers. Certainly we have a shortage of scientists in the country and in the world, and you indicated that you didn't want to see excessive regulations that might discourage that research. Do you think that this legislation or the protocol process, either one, would create those disincentives?

Dr. SULLIVAN. I think, as the Chairman pointed out to me some exceptions that I may have missed in the legislation, indicating that not all environmental law here is being applied to the Antarctic would certainly help that. My only feeling is that perhaps it's

not only the legislation, but how it is implemented and who is overseeing the implementation of that in Antarctica.

The only thing I can think of as an example is at the University of California or the University of Southern California, where I am currently, I find that radiation safety officer is a person who can keep you out of trouble legally—can protect you from using radioactive materials or working in a physician's office near an x-ray machine—and they apply the law as it should be. And yet others that I have encountered can be so stringent in their interpretation of the law that they basically shut down the doctor's office or they shut down the laboratory. And it's that kind of difference that I'm more worried about than I am the specific words within the legislation.

Mr. PACKARD. From the other witnesses this morning, we almost heard unanimously that they didn't see a conflict between preserving the environment in Antarctica and the pursuit of research. This panel, I think, have expressed rather closely to the opposite, that you do see the potential of a significant conflict between preserving the environment, as being proposed, and the pursuit of research—the continued pursuit of research in the pristine area of Antarctica. I'd like to know just whether you in fact feel that there is a compatibility between the two and if the legislation or the protocol process would interfere with that compatibility.

Dr. Sullivan first, and then we'll go right down the line.

Dr. SULLIVAN. I don't think we're talking about incompatible objectives. I think it may depend, again, on who defines what environmental impact is. I think Dr. Rutford was most eloquent in his presentation saying, "If you're there, you're having an impact." I don't think you can argue with that in the very purest way. It's what level of impact are you willing to tolerate. I think in the past the U.S. program and other programs of other nations have had more impact than they should. I think those problems are recognized, and they're being addressed by the Science Foundation right now and by the legislation that we're considering. I feel comfortable with that.

Mr. PACKARD. Mr. Craig?

Mr. CRAIG. I agree with Dr. Sullivan and also with what previously was said by Dr. Rutford. I do think I would not agree with your interpretation—at least, my position—that conduct of science and preservation of the environment are incompatible. It is a matter of degree. I think you used an example in your own State of wilderness areas and so on. It is, to some extent, interpretation, but I think things have changed, too, in terms of techniques, technologies, and approaches to environmental remediation where impacts have been made and where certain actions can be taken to restore or to remove from the site the impacts that are necessary, for example, in the conduct of science, as well as in the conduct of tourism.

So I would say that this is not a case of either/or. I think that science can be conducted. The environment can be preserved, and I would be very concerned to have anyone say that it's either/or. Thank you.

Dr. RUTFORD. If I left the impression that I thought the two were not compatible, I apologize. My point is that there is probably no

single group that is more concerned about what's going on in Antarctica than those of us who work there. I mean, 32 years of my life have been off and on down there, and I'm where I am today because of the experiences that I had there. What we are concerned about—and it is amazing to me that here we sit, and our previous speakers who represent special interest groups and the environment and the scientists here appear before you as antagonists rather than side by side. That concerns me. It really does, and we continue to try to talk about it, and it's because—my personal belief is that—our view is that—let's reason together. Let's try to get the job done, but let us continue to do our research.

All of us scientists are scared to death of rules and regulations, because if you write the rule and regulation and you're doing research, that assumes that you know what the results of the research are going to be, and, therefore, you can put some regulation on what has to be done, and if you knew that, you wouldn't do the research to begin with. And so the concern is that it's not the—we all want to preserve the environment. We simply don't want to get ourselves to hog-tied by rules and regulations that you can't move and operate.

And we can live together and we have in the past and we will in the future, and I'm a great deal more optimistic about the preservation of the Antarctic environment than some of the other people I've heard testify here today.

Mr. PACKARD. You express the very same message that we hear, though, throughout everywhere, and that is the concern for being overregulated and so forth. The developer, the land owners, the farmers, the business people, the industrialists all have the same concerns, and that's the difficulty of our job is to try to find a way to balance that all out so that we do preserve the environment and we do protect beautiful and pristine areas like the Antarctic, but at the same time we promote and foster good research, we foster good agriculture, we foster good industry, and the likes, and that's not an easy task sometimes.

Thank you, Mr. Chairman.

Mr. BOUCHER. The Chair thanks the gentleman and recognizes the gentleman from Oregon, Mr. Kopetski.

Mr. KOPETSKI. Thank you, Mr. Chair, but I have no questions today.

Mr. BOUCHER. Well, that concludes questions of this panel, and the Chair extends a very sincere thanks to each of these gentlemen for traveling a lengthy distance in the case of all three witnesses to share these views with us. The ideas expressed were very articulately expressed, and the testimony was well-prepared, and the subcommittee is grateful for that.

There being no further business to come before the subcommittee today, this hearing is adjourned.

[Whereupon, at 12:26 p.m., the subcommittee was adjourned, to reconvene at the call of the Chair.]

